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MEDICINE AND SURGERY

ONE

INDUCTIVE SCIENCE;

BEING AN ATTEMPT TO IMPROVE

ITS STUDY AND PRACTICE, ON A PLAN IN CLOSER ALLIANCE WITH INDUCTIVE PHILOSOPHY,

AND OFFERING, AS FIRST FRUITS, THE

LAW OF INFLAMMATION;

ADDRESSED PARTICULARLY TO THE MEDICAL STUDENT AND THE PROFESSION, BUT EASY AND INTELLIGIBLE TO THE PUBLIC ALSO:

THE WHOLE BEING THE INTRODUCTION AND FIRST PART OF

A SYSTEM OF SURGERY.

BY

GEORGE MACILWAIN,

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"A cripple in the right way may beat a racer in the wrong."—BACON.

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TO HIS MAJESTY
THE KING OF THE BELGIANS.

May it please your MAJESTY,

IT is now nearly seventeen years since I became Surgeon to an Institution of which your MAJESTY is the kind Patron and a munificent Supporter; I cannot forget the assistance which I derived from your MAJESTY'S vote, both directly and indirectly, in securing that appointment.

Strongly impressed with the conviction, that it is incumbent on those who enjoy extensive fields of observation to render them contributory to the interests of Science, I have endeavoured to act in conformity with this conviction, so far as has been compatible with my ability, my other duties, and the too frequent interruptions of indisposition.

The public are already in possession of several of my attempts in relation to particular subjects. The present work has objects of a more general and of a higher nature; and it is in the hope that it may contain some evidence that I have not altogether neglected the opportunities placed within my reach, nor been unmindful of the support with which your MAJESTY was pleased to honor me, that I avail myself of the gracious permission of dedicating it to your MAJESTY.

That your MAJESTY may long enjoy uninterrupted health and happiness, is, with sentiments of profound respect, the fervent wish of

Your MAJESTY'S

Most devoted and faithful Servant,

GEORGE MACILWAIN.

London, Argyll Place, Regent Street.
January 10th, 1838.

PREFACE.

BEFORE the reader peruses the following pages, I am desirous that he should have a general idea of the views and objects which have led to their publication.

In common with many others of the profession, I have long been dissatisfied with the condition of the science, in the cultivation of which the greater part of my life has been employed. I have sensibly felt the humiliating conviction that medical science has not kept pace with other departments of knowledge, either as to its progress or diffusion; and that, as a consequence of this, it is encumbered by many circumstances which impede its progress, abridge its utility, and derogate from the rank of those who follow it as a profession.

We can in no way explain these circumstances by any reference, either to the paucity of our facts (for of these we have abundance), or to any deficiency of industry, in at least a considerable number of the cultivators of medical science; but it is easy to perceive that there is a great difference in the *manner* which has characterized our investigations, when compared with that observable in the cultivation of the other sciences.

In these, there has been a pervading observance of inductive reasoning, as taught us by Lord Bacon: in medical science, we observe as pervading a violation of it. I speak generally; I do not mean that it is *always* observed in the one case, nor *always* disregarded in the other.

When we connect with the foregoing the fact that there is, besides, a very demonstrable correspondence in the progress of every science, and the observance of inductive reasoning in its cultivation, it is impossible to be otherwise than anxious to enquire at least whether the slow progress of medical science may not be attributable to that general disregard or violation of rules of reasoning which have so materially assisted the progress of all others.

As regards any benefit derivable from the diffusion of knowledge, medicine has laboured under peculiar disadvantages. We observe a great difference in the extent and nature of the ignorance of the public on medical and other matters. In general, ignorance consists in the simple absence of knowledge. In medicine, it is accompanied by all sorts of error.

Instead of being left in a condition in which men, under the influence of inclination or necessity, seldom fail to discover something of the truth in nature, the public have been taught every variety of falsehood and absurdity. Their passions, prejudices, and prevailing weaknesses, have all been excited in aid of every variety of quackery; whilst the absence of information has left them without the smallest protection from imposition. To such an extent has this been carried, that the most successful quack almost ever known used to say that the secret of his success lay in the simple proposition—"Tell the public something in regard to medicine which common sense shews to be impossible." For the moment, we are astonished at the effrontery of such a confession; and yet, if we look around us at the present hour, London alone furnishes too many exemplifications of the application of this precept: but we must not look for it alone in avowed empirics; there is too much of regular as well as of irregular quackery. Teach the public but truth, they will become quick and intelligent detectors of *all* species of imposition: nor is this all; by knowing how and what they are to observe, they will also become very useful assistants in scientific investigations, as I have already often experienced.

It has been usual to attribute the low state of medical science to the difficulties attending its cultivation. I can in no way subscribe to this opinion. Like other sciences, it has its difficulties, both general and peculiar, doubtless; but it has also great advantages. The difficulties of which we complain, as resulting from that interminable variety of form under which disease obliges us to investigate the laws of nature, shew how little we have wrought in the right way. Properly regarded, these varieties are of the highest utility: they are the strongest and most necessary tests of any law concerning which it may be our object to acquire; and furnish ready to our hands, in countless forms of disease, variations of conditions, which, in other sciences, we are obliged artificially to institute. Besides which, it is only through the multiform *gradations* in disease, that we learn the true relations of this "nu-

merous and dissimilar family;" whilst the very diversity of character which they present produce this remarkable result—that those characters which they have in common (in all matters the most essential to know) stand out in stronger relief from the very diversities by which they are in different examples accompanied.

My first object has been to point out some of the causes which have impeded the progress of medical science, and to expose some of the more prevailing errors; then to collect a certain number of facts, and to conduct the consideration of them more in the spirit of common sense or inductive philosophy; and to offer, as the first fruits of this mode of study, what appears to me to be nothing less than the "law of inflammation."

I have here been, in one sense, breaking a new soil, and I am aware how poor the first harvest often is to those who do so: but the nature of the soil may be determined, its capabilities even ascertained; although the more abundant produce may be reserved to future husbandmen, who, profiting alike by the knowledge and mistakes of former cultivators, often discover improved modes of culture, and derive more abundant crops with diminished labour.

The task of improving any science is difficult; but I am strongly impressed with the idea that truth has no character more striking than its simplicity; that the discovery of it requires not extraordinary talent, so much as a plain, unfettered, and properly directed understanding; and that, although the diffusion of truth varies in its progress, being always slow, yet in time it becomes established. Like hardy plants, it may thrive best in genial soils, but it will live in any.

The motives with which I have put forth the work will ensure me from any severity of disappointment. The size of the edition, and the price of the work, are such as render any pecuniary object out of the question; whilst, had reputation, in any sense of the word, been my leading object, I should have pursued it much more auspiciously by the publication of various matters more in conformity with prevailing opinions, and (with the materials around me) requiring scarcely a tithe of the labour.

I address myself chiefly to the *medical student;* because it is to him that we must look for the advantages which any improved mode of study may be *ultimately* calculated to produce; in that, his faculties are less encumbered by preconceived errors—in the devotion of his time to the science—and in the longer period for observation which he will probably enjoy. I have thrown the

whole into the form of Discourses, because, whilst this mode allows of a more familiar style, it enables me to employ that in which I have been accustomed to express myself.

To many of the profession I look with hope and confidence that the suggestions herein contained will not be disregarded; for, with respect to the position of medical science generally, I know that I am not singular, either in my views or anticipations.

I am desirous, for reasons before mentioned, that the public should be informed; and I should be vexed to feel that the book contained a single sentence which was not intelligible to every person of *moderate education*. I profess not, indeed, to instruct the *whole mass;* this, I think, cannot be done yet;—we must teach "down stream," as it were; and, in time, that general intelligence will be diffused which can alone raise a glorious profession to that station which the high nature of its objects and its unquestioned utility alike deserve.

I have sensibly felt, however, the difficulty of addressing such different classes of readers; that which seemed necessary to one class will sometimes appear tedious, or even puerile to others: but in teaching, I know not how this is to be avoided; even in the limited audience of a medical school, the teacher, to instruct the whole, must often deliver that which is trite and wearisome to the better-informed. For the same reasons, I have not been able wholly to avoid repetitions; but these, I hope, will be found unimportant and excusable.

The size of the volume (as in manuscript) has been considerably reduced,—1st, by the omission of authorities, which would have increased its size and expense, and have made a parade of learning without adding to its utility; 2ndly, by reducing the description of the body, originally intended to have been given, to a very few general remarks, for which the object must be the apology; 3dly, I have not scrupled to omit, in aid of the reduction in size, many arguments and illustrations in support of the law of inflammation. Nothing would have induced me to do this but the following considerations:—I am much more desirous of exciting reflection, than of at once carrying conviction; and the facts and arguments omitted will, from time to time, appear in connection with different diseases. I am not in the least degree anxious that my views should be hastily adopted: nothing is more injurious than the reception of propositions without examination. If they be false, it perpetuates error; if true, it abridges their utility in leaving

their principles unexamined, and thus narrowing the mode and extent of their application.

As to the facts, I have endeavoured to select those which are either most common, most trite, or most indisputable. The conclusions the reader must examine. I would advise the student and the general reader not to attempt more than one Discourse, at most, at one time; and to peruse first the general observations on the body (imperfect though they be), contained in the Appendix. I shall conclude this Preface with the following story:—

It is said, that, in the family of the Sciences, MEDICINE was once afflicted with a certain "halt or lameness," which, whilst her sisters were yet young, did not deprive her of their society. As they grew up, however, she could scarcely ever accompany them in their various rambles into the fields of Nature; and, when she did, she seldom brought home any of the fruits or flowers which they so abundantly gathered; so that she saw little society, and this too of an inferior description, being wholly confined to a neighbouring family, the ARTS. Various remedies had been tried for her relief; all sorts of specifics from the animal, vegetable, and mineral kingdoms of Nature. I know not how many thousand animals had been slaughtered in every variety of mode, and by every conceivable process of torture, in the hope of finding something that might throw light on the complaint under which MEDICINE laboured; but all in vain; until at length it was generally thought that her malady was incurable. At last, EXPERIENCE suggested to REFLECTION, that at one period the whole family had been in a very delicate state, but that their health and strength had been established by the employment of a remedy recommended by one "Bacon." They decided, therefore, that this remedy should be tried, and the treatment conducted, as it had been in the other cases, by COMMON SENSE.

At first, COMMON SENSE met with great difficulty from various members of her acquaintance:—MEDICINE had little faith in her skill, and AVARICE, INDOLENCE, and PREJUDICE were constantly interfering with her plans; they would also often lead INDUSTRY away, when COMMON SENSE most required her help; whilst EDUCATION, whose assistance COMMON SENSE highly valued, would frequently be absent. Notwithstanding all these difficulties, COMMON SENSE proceeded, and it was evident that MEDICINE improved; and as the improvement became marked, the sister

SCIENCES took a great interest in her case, and often furnished COMMON SENSE with useful suggestions. As MEDICINE recovered, even AVARICE and INDOLENCE beheld her progress with satisfaction; and the scoffs of PREJUDICE were at length silenced. In the end, MEDICINE recovered, and when her health was restored, the beauty of her stately form was beheld by the whole family with admiration. MEDICINE now lived in harmony with her sisters; and in the constant interchange of kindly offices in their respective labours; but, as might be naturally expected, she looked up with most reverence to her benefactors, Common Sense, Experience, and Reflection.

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MEDICINE AND SURGERY,

REGARDED AS

ONE INDUCTIVE SCIENCE,

ETC.

DISCOURSE I.

SURGERY is to be regarded as a branch of Natural Philosophy; it has well-marked and interesting relations to most of the other departments of Science, and more or less of connection with them all. The sustained impression of this connection is important. It facilitates the acquisition of that which is already known, and, by enlarging the field of observation, has a direct tendency to accelerate the progress of discovery. To follow out this first proposition in a continuous chain of illustration, would occupy too much space to be compatible with the more immediate objects of this work. The various relations of medical science will, however, sufficiently appear in connection with different subjects. I will here only observe, that the divisions of knowledge into various sciences, though very convenient, is entirely artificial. The sciences have all one object in common; that is, the interpretation of the laws of nature: and as all these laws exhibit mutual connections, it follows, that all the investigations, of any of them, inasmuch as they have for their object to explore the particular relations of particular parts of these laws, should embrace the recognition of the general connection which such parts have with the whole.

The idea that Surgery is a sort of abstract science, is false, and therefore injurious. This notion, and others equally erroneous, have so effectually retarded the progress of medical science, *as to render it the lowest in the scale of improvement.* It will be one object of this discourse to point out some of the causes of this inferiority, and to recommend attempts for their removal. So far is surgery from being an abstract science, that there is no one

which it would be more impossible to isolate from general philosophy. In no one branch of human knowledge do we find evidences of that connection which exists between it and all others more obvious, more intelligible, or, indeed, more striking, than in surgery. The more we extend our views into the various departments of natural philosophy, the more are we struck with their mutual connection; so true is this, that we arrive therefrom, at one of the most sublime truths deducible from natural evidence. We are carried, from contemplating the universal relation of so many particular instances of design; to the conviction that they all emanate from *One* Almighty Creator. Not only, therefore, is *surgery* not an abstract science, but there is in reality no such thing. The notion is a dream of error, an idol of the mind, as Lord Bacon would call it, which must be removed on the very threshhold of our studies. This, like other errors, results from a habit of restricting our observations to the several relations observed between the different parts of any one subject to the other parts of the *same* subject; but this should be regarded as the ultimate *end*, not as the sole *mode* of enquiry. Lord Bacon observes, "No man can discover the nature of a thing, in that thing itself, but the inquiry must be extended to matters more in common."

To conceive that man, or any thing which relates to him, should be otherwise than in connection with the various laws governing the world he inhabits, is not only exceedingly difficult, but, on reflection, will appear to be to the last degree improbable. But the difficulty or improbability becomes nothing less than an absurdity when such a supposed isolation is referred to his body, a part which he possesses in common*, which he holds by a similar perishable tenure with other countless multitudes in the creation; these again forming fresh connecting links in the chain of material existence. I here allude to that gradation which is plainly observable in the different tribes of animals, and is continued through the vegetable, even to the mineral kingdom of Nature. If we expected any thing in man to be governed by peculiar or specific laws, the enquiry would be more auspicious if directed to some distinguishing peculiarity; the more striking, the better for our purpose. The mind, in fact, would appear a much more likely instance than the body.

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* I here only allude to that assemblage of functions which constitute his present existence, and which are obviously adapted to his present condition.

But if the contemplation of the mind, as contrasted with the consideration of the body, appear to favour the idea of abstract and peculiar laws of government, and if that examination which detects connection every where else should appear to fail in establishing corresponding relations here,—still the simple fact that it is this Mind which enables man to comprehend all, or indeed any, of his relations to the globe in which he lives, would of itself be sufficient to correct any idea of disjunction. It is true that we discover enough in the mind to shew that it is peculiar in its attributes, that it thinks, compares, judges, that it possesses, and feels the possession of higher powers and more exalted destinies than are accorded to the rest of the creatures of this planet: it is true that the convictions thus arising from something in its own elements are confirmed by higher authority, and that, whilst the Creator has spoken to other things by laws only, he has spoken to the mind of man both in laws and by direct communication; yet I say, notwithstanding all this, whilst the mind resides in, and is connected with matter, we trace numerous connections between it and other creatures, in the analogy observable between the instincts and propensities of animals, and the passions and feelings of Man.

But, to return. The notion of Surgery being an abstract science, limits the enquiries of its professed student to that accumulation of details to which the term practical is usually applied, such as Anatomy, Physiology as arising out of it, mechanical operations, and the use of remedies. It tends to preclude any enlarged enquiry into the laws of which diseases are but the exemplifications, and debars the science from that light which would otherwise be imparted to it by the minds of thousands of philosophically minded men, who are deterred at present from venturing on subjects, hitherto represented to them as appertaining to a specific study. In regard to the connections of medicine and surgery with other sciences, it will be sufficient, in this place, merely to *mention* Anatomy, Physiology, Chemistry, and Botany; whilst the relation which the eye has to light, the ear to sound, which respiration and circulation bear to the laws regulating the pressure or motion of aëriform or other fluids, the mutual adaptation of various parts of the body, to mechanical principles; or the forces acting on the body, either in relation to parts or the whole, to other departments of knowledge, illustrate the connections of surgery with optics, acoustics, pneumatics, hydraulics, mechanics, &c. respec-

tively. Chemistry has still more interesting relations than those which belong to it in a pharmaceutical sense. Philosophical chemistry, in unfolding to us various laws observed in the composition of tangible substances, materially assists us in forming some idea of organization; whilst, in giving us some notion of the minute divisibility of matter, it enables us to apply it in the consideration of taste and smell; and the electro-chemical branch of the science has opened to us a wide field for enquiry concerning secretion, excretion, and the relations which subsist between the chemistry of what is called unorganized nature and that of animals. The sciences which relate to variations of temperature or of climate, or to the causes, whether local or general, whereon these depend, are also intimately connected with medicine.

The circulation of the blood is conducted with a very evident observance of the laws of hydraulics; and thus a knowledge of the laws observed by fluids, when in motion, enables us to comprehend the beauty of many arrangements in the blood vessels which, without such reference, would be unintelligible. A vast number of very cruel experiments on animals have only tended to develope what the most simple application of the elements of hydraulics would have made certain without any such modes of experiment. Haller "On the Circulation," &c. But whilst thus the study of hydraulics explains many circumstances in the distribution of the circulation, it is more than probable that the examination of the circulation, with this view, would unfold to us some, perhaps many, improvements in hydraulics.

Mathematics may be made of great use in that part of natural philosophy which has direct bearings on medicine: they should also assist in disciplining the mind to a close method of reasoning; but, practically speaking, as regards our own profession, they are seldom found to achieve the latter object. They are apt, by accustoming a man to one kind of demonstration, to disqualify him from obtaining conviction from any other. The mathematician has his science of unknown quantities; so there is also a kind of algebra in natural philosophy: but the one mode of reasoning leads to a result apparently certain and demonstrable; the other always keeps the mind humble and enquiring, and, in conducting it even to the most lofty conclusions, presents to the mathematician a doctrine rather of probability than of demonstration. I need not say that the natural philosopher thinks otherwise. I here only speak of *ordinary* mathematical attainment, and its most commonly

observed effect. I do not mean to deny the power which mathematics have of being really applied to the purposes of the natural philosopher; I only say that, in regard to *medical* science, such an application of them is seldom made. In fact, I have not often found that a mathematician is a very acute reasoner in natural science: but I speak of the mass, and not of a few distinguished individuals who convert mathematics to the higher ends which they are calculated to serve*.

But I here only cursorily mention the relations of medicine to the other sciences. These will be more particularly dwelt on in connection with the various subjects to which they are more especially applicable, and which will therefore more usefully impress them on your recollection. I have said that medicine is behind the other sciences, and that one of my objects will be to

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* Mathematics:—The unknown quantities of the natural philosopher are the laws of Nature—he requires a datum like the mathematician; and, to reason, not less demonstrable than are mathematical data to the senses. The data assumed by the natural philosopher are, that every thing is formed in the most perfect adaptation to the uses for which it is designed, and that in the execution of these functions it is governed by certain laws. So far the sciences, I conceive, commence on grounds equally secure, to say the least of it. But the proceeding onwards of mathematical and natural philosophy are very different. With a view to inculcate the vast importance of observing obvious phenomena, it will be my object presently to shew that the most important advances in natural science have resulted from such sources. But mathematics are a different thing. It is *possible*, I conceive, for a man to be in some sort a mathematician without having scarcely observed natural phenomena at all. There are no phenomena whence the *primary* truths of mathematics are wrought by inductive reasoning, which is the very soul of natural philosophy. In mathematics a thing is supposed to be so and so, because the external senses preclude the possibility of conceiving it to be otherwise; and then its relations of time, quantity, &c. are wrought out by a particular exercise of an intellectual faculty: thus arise certain additions to the original datum, developing not only certain times, numbers, or quantities, but also certain characteristics which they have, which may be termed, perhaps, the laws of their several relations or proportions. Regarded in this condition of development, the science becomes of material assistance in the interpretation of Nature; for if once any phenomenon in Nature can be made to refer to any definite relations of number or quantity, the mathematician can then ask questions, as it were, of Nature; in other words, he can experimentalize on the application of a law, or the appearance of a law in any one phenomenon, to the explanation of other phenomena whose laws are yet unknown. In this way mathematical science becomes an engine of great power, in combination with an inductive reasoning; but in its origin it obtains nothing from the observation of the phenomena of nature It in some sort precedes this, and may be regarded as an instrument, powerful, but extraneous.

point out *some* of the causes by which its progress has been retarded. But to enter into these as separate subjects, would lead to a very inconvenient digression; and I hope to make them sufficiently intelligible whilst I am endeavouring to shew you how you should proceed in the study of our profession. In the first place, however, let me say a few words on the definition of surgery and medicine. It is difficult to drive from the mind established notions; yet, if they be erroneous, to do this is essential to the inculcation of truth. The usual definition of medicine and surgery favours the idea of an abstract science. It is said, of both medicine and surgery, that they consist in studying the nature and cure of diseases. I object to such a definition; not because it is not true, but because it does not convey the whole truth; it is, in fact, imperfect.

Medical science is, in fact, the study of the laws and relations of animal bodies, in order to ascertain the modes in which Nature relieves diseases or repairs accidents; and to determine the conditions of the whole body, which favour or impede these processes in its various parts; with an especial view, in the one case, to the *maintenance* of such conditions; in the other, to their *removal.* The achievement of this point is the common object of medicine and surgery. Surgery is sometimes called an art. If it be an art, however, it is one of the lowest description; inferior indeed to the most ordinary handicraft. As well might you call astronomy an art, because it requires the adjustment of optical instruments. Surgery is never an art but in consequence of its imperfection as a science; and even then it is one of very simple character. As an art, and one that can be acquired in less time than any other with which I am acquainted, it will remove a stone from the bladder, will tie an artery, or will amputate a limb. But, as a science, it would prevent the formation of the stone, the changes in the coats of an artery, or the forces of the circulation which produced the aneurism, and put a stop to the morbid actions necessitating the removal of the affected member. Even where the idea of art is most obtrusive, as in fractures and dislocations, so various are the influences derived from the condition of the body at the time of their occurrence, that where Nature requires any assistance beyond replacement of the parts, it is altogether scientific; and although operations are mechanical, yet their success depends on general principles of treatment which have reference to the state of the body, both before and after their performance. Neither

can the replacement of broken or dislocated parts be fairly called an art; since a great deal will often depend on a knowledge of the laws of muscular action, and of the means by which the impediments afforded thereby are best overcome or evaded.

In thus contending that surgery should be regarded as a science, it is necessary to observe that I speak more with reference to what it must necessarily be as a branch of natural knowledge, than to any *actual* possession which we have of such knowledge. But if we regard it as one department of medical science, humble though its pretensions may be, they appear to me to be superior to what is called medical science, in popular contradistinction to it. The difference between an art and a science seems to be essentially this:—an art consists in the knowledge of certain means by which we can produce certain effects; but without our understanding the principles on which they depend, or, in other words the laws of Nature, of which they are the necessary exemplifications. A science consists in the knowledge of a certain number of phenomena, and the power of referring such phenomena to the laws by which they are governed. Galileo's pump exemplifies the art, our own pumps the science; though the mechanical construction be the same. In this sense, medical science,—I here include in that term both medicine and surgery,—are at so low a point, that their claim to be considered sciences at all, in relation to our actual knowledge, becomes almost questionable; but surgery seems to me to approach the character of a science much more nearly than other branches of medicine; and this, not because it is easier, as has been somewhat infelicitously asserted by a modern writer, but because it has, so far at least as Mr. Hunter is concerned, been cultivated in a more philosophical manner; that is, by observing what Nature does in repairing injuries, &c. and by founding our proceedings, if not on her laws, at least on their proximate proceedings. Herein lies the beauty of most that Mr. Hunter did, which has proved really useful; and which has led to a certainty and uniformity in many surgical matters which we do not find in the practice of medicine. For example, if I wish to heal a wound now, I evidently found my proceedings on what I know to be Nature's processes, and my measures are confined to the removal of what must necessarily retard or prevent her operations; but if these expedients refer to any thing but local circumstances, if I am, in short, obliged to refer them to the general condition of the animal, I find

that medical science by no means affords data to reason on, corresponding to those which surgery has deduced from previous investigation of the processes going on in the part.

I need scarcely observe, that the ultimate end of the studies of the surgeon is to understand the laws of disease; and this of course he cannot do unless he comprehend the natural functions of the body. Now, in all bodies whatever, there is found to be a certain connection between their structure, or the arrangement of their parts, and the phenomena which they exhibit; and in none is this connection more important than in animal bodies. Hence the knowledge of this structure becomes a point of primary importance; and this, in regard to animals, constitutes the science of Anatomy.

You will easily comprehend the importance of this science, when I tell you that the various interesting relations which are observed between the structure of animals and their several functions, have even led certain men to believe that life itself was nothing but a consequence of certain structural arrangements. This idea, which I believe to be very erroneous, as I shall endeavour to shew you in a subsequent discourse, I merely mention here for the reason I have stated. But many other considerations evince the importance of anatomy. How are you to judge of the seats, much less the causes of diseases, unless you know not only where the affected parts are situated, but unless you are acquainted also with their several anatomical relations?

In surgery,—and I here speak of a branch of medical science which, however humble its present pretensions, appears to me to have advanced beyond every other,—anatomy becomes in the highest degree necessary. Though, with the advancement of scientific knowledge, the number of occasions for operations has sensibly diminished, still there are many diseases which our ignonorance obliges us to remove, and others, which not being able to prevent, we relieve by operative proceedings.

Now, to attempt to remove a limb, to take a stone from the bladder, to tie an artery without including the vein or nerves which accompany it, or to remove tumors often involving more or less of important structures which must be interfered with as little as possible; I say, to do all or any of these without a clear knowledge of the parts on which we are operating, is a thing so obviously fearful, that no man in his senses would think of attempting it. But, besides, there are various symptoms accompanying

almost every malady, which it is impossible to understand without knowing the anatomical relations of the several parts in the interior of the body; whilst, with such knowledge, many, I had almost said most of them, become intelligible.

Neither should a student be satisfied with a mere general knowledge of the subject, such as will enable him to pass the ordinary examinations; he should be perfectly acquainted, not only with the origin and course of vessels and nerves, the connection of the several viscera and their various relations, but he should also be well informed as to the distribution of the various tissues of the body; for he will otherwise never obtain a clear notion of the elements of which the body is composed, nor will he arrive at any useful application of anatomy or physiology to pathology, or the doctrine of disease. A good general knowledge of the subject, such as would save him from egregious error, such as would enable him to understand the general principles of medical science, might certainly be obtained without involving acquirements so extensive as the above; *and I wish the public were in possession of such knowledge, since its attainment is easy, and since, by enabling them to discriminate between men of information and those who were ignorant, it would be a far better security than any legislation can give, not only against avowed empiricism, but all other kinds of quackery.* But the *medical practitioner* who should be content, through indolence or supineness, with this kind of knowledge, would be in the highest degree culpable, and could not undertake the responsibility with which he is often invested without a reckless absence of principle.

A very important branch of anatomy consists in the knowledge of those changes which are produced in various organs by the influence of disease. This is what is called morbid anatomy. Now diseases frequently produce changes of structure in organs, destructive of life; and even where the change is not of a kind or extent sufficient to destroy life, yet it is found materially to modify the phenomena on the subsequent occurrence of disorder; frequently, in fact, rendering disordering influences fatal, which, when they operate on healthy organs, are found to be of trivial importance; and thereby rendering it necessary that the treatment should be materially modified in the two cases. The greater danger attending disordered action, occurring in an organ previously diseased, results sometimes from the direct influence which it exerts on the whole economy, sometimes from an indirect agency, in the greater tendency which it has to derange one or more organs in addition

to that primarily affected, in a manner more particularly to be dwelt on when I have to speak of what we call the Sympathies of the body. You will perceive, by the foregoing, that morbid anatomy must also have very important bearings on our power of distinguishing the seats of various disorders (diagnosis), and also on our decision as to the probability of the success or failure of treatment (prognosis).

Morbid anatomy, however, *regarded abstractedly* as a record of certain alterations of structure in different parts, is of no use; it is only useful as one step, and that a very small one, to the investigation of the causes of such alterations. This is the only thing worthy the name of pathology. The distinction, however, of pathology from mere morbid anatomy is by no means sufficiently impressed on us; so little indeed, that one who collects a multitude of diseased products often obtains the credit of being a pathologist, when he has as little notion of the causes of disease, and perhaps has given as little study to the laws of nature, whence the diseased products result, as he has to algebra or any other science to which he may never have directed his attention.

The utility of investigating morbid structures will depend on the mode in which you set about it. In the first place, it is absolutely necessary that you be familiar with the natural appearances of the various structures; otherwise you would overlook many things which are the result of disease, and be apt to mistake appearances, with which you may be unacquainted, for the effects of disease, which are not so. Then, in examining bodies, there is no great advantage to be gained, unless you know what the symptoms were during life; and as one case seldom allows you to arrive at any conclusion of general application, every dissection should be recorded, and the general results compared with the experience of others, as exemplified in different collections of morbid anatomy, or as recorded by men of experience in this branch of enquiry, as the celebrated Morgagni. But the symptoms of disease do not comprise the whole of the enquiry. The general history of the patient, his habits, mode of life, locality, state of his excretions and secretions, and, further, as they were influenced by extraneous causes; whether these were intentional, as medicine or diet, or unavoidable, as climate or moral causes; are all material elements in the enquiry, in connection with the change of structure, if we are to make it subservient to the requisitions of pathology. The actual histories attached to preparations are usually of

little real use. They will teach what is known; but if our knowledge is to progress, we must extend our investigation in the manner I have mentioned. Usually, when morbid structures are examined with more than ordinary care, it is either to discover the arrangement of the vessels of the diseased part (if its organization admit of this), to determine its chemical composition, or to compare its obvious physical qualities with those of other specimens, with a view to form our prognosis (supposing the part to have been removed by operation), as to whether the disease be likely to return, or whether the patient is even to recover. The latter, as one of the means employed to ascertain the state of the economy whence it originated, might be made a very useful element in preventing its recurrence; but I never see it converted to such purposes. Whilst, as regards the other two points, namely, the arrangement of the vessels, or the chemical composition of the part, it is very probable that neither the one nor the other, did we know them, would be of any use; since we do not find that either has hitherto unfolded to us any law in the animal economy. They shew us of what life is capable; they sometimes, in a negative manner, help us to a notion of its chemical powers; but as to the only thing really of use, they leave us, as we might have anticipated, as much in the dark as ever. If we are ever to deduce any useful knowledge from investigation of morbid structures, it must be through a previous intelligence of those disturbances of the economy of which they are assuredly the product, and which, therefore, though it may probably also have accompanied, must certainly have preceded, the deposition of the morbid structure. I appeal with confidence to the experience of the whole profession, in proof of the entire absence of such a plan of investigation. I am not blind, of course, to the fact, that it is always difficult, and often impossible; but the difficulty is the rule, the impossibility the exception; and that the progress of pathology, as regards the contributions through the means afforded by morbid anatomy, depends on the encountering, and in some sense overcoming this difficulty, is, in my opinion, demonstrable. For many years I examined all the bodies of those who died in the Institutions with which I have been connected, where I could obtain permission, as well as elsewhere, whether the symptoms were known to me or not; but if I place the time spent, and perhaps health also, against the advantages acquired, I am afraid much of the time might have been far better employed. The truth perhaps is, that, in acquiring a familiarity with the general appearances of

health and disease, the examination of bodies is of itself, to the student, not altogether an useless occupation, even when you are somewhat advanced in the study of the profession. Still, if you are an industrious student, your prosecution of morbid anatomy will be more advantageously conducted if confined to the examination of cases with whose symptoms at least you have been acquainted. You will find life short, and every succeeding year more precious than the last; and I hope to shew you, that, as surgeons, you must not amuse yourselves in unravelling minute structure, or in collecting cabinets of curiosities. In fact, anatomy of any kind is only useful as *helping* you to understand the natural uses or functions of the various parts of the body (physiology), and the causes of those departures from them which constitute disease (pathology); and it is requisite to remember also, that anatomy is only *one* of the means for the attainment of these ends.

In insisting, therefore, on the importance of anatomy, both general and morbid, I must guard myself from misconstruction; since there are few mistakes more mischievous than the idea that medical science rests exclusively on an anatomical foundation. This idea, to which the real importance of anatomy lends considerable colouring, has, I believe, materially retarded the progress of our science; wherefore I shall endeavour to shew you that other things are requisite besides anatomy to the prosecution of our researches; and that, in fact, anatomy itself only becomes useful in helping you to the observation and interpretation of phenomena. I have seldom observed a person occupied in an undue proportion in anatomical investigations, whose reasoning was not cramped by it. Even Mr. Hunter cannot, I think, be excepted from the foregoing remark; inasmuch as many of the conclusions which he deduced from anatomical modes of investigation would rest even more securely on physiological phenomena, accessible by simple and direct observation of the living body. To this point, however, I may refer hereafter.

If medicine held that kind of dependence on anatomy which it is too generally conceived to hold, there should have been something more of proportion observable in their progress. But we look in vain for such proportion. Let us compare the state of these sciences respectively, at some remote period, with their present relative condition. Suppose we take the time of Celsus; this is about 1800 years ago: we shall find that the anatomy of that day was comprised in a small compass. It

consisted chiefly in the general knowledge of the form and arrangement of the bones, muscles, joints, brain, and other viscera*.

I need scarcely say that the real relations of the vessels and the circulation were unknown; neither need I take much time in dilating on the comparative advancement of human, to say nothing of comparative, anatomy, in modern times. I may here merely mention the names of Haller, Hunter, Cruickshank, Zinn, Walther, Sœmmering, Scarpa, Bichat, Tiedemann, Cuvier, Charles Bell, and I might add others equally illustrious and refer you to their works, to shew the immense progress which has been made in this department of knowledge. But I fear that if we look for a corresponding advance in medical science, we shall be much disappointed; and further, that in some points we shall find that we have scarcely advanced at all. In the first place, look at Celsus's directions for the preservation of health. I confess to you I know not where you will find any better: or consider his observations on fever; it will be difficult for you to collect any, from among modern writers which are, *on the whole*, more judicious.

If we take the weaker parts of Celsus, as, for example, the absurd variety which characterizes many of his prescriptions; I apprehend we shall not have much difficulty, at the present day, in discovering similar violations of all rules, by which alone anything like a philosophical investigation of the effects of remedies can be conducted.

I have mentioned the enlarged views displayed on some subjects by Celsus. It is not, however, by these alone that the state of medical science in his time is indicated. The symptoms of different diseases described by him are marked, in many intances, by great correctness. An example or two may be here given: his general views are too voluminous, of course, for quotation, which, since his work is so easily accessible, is moreover unnecessary. He gives the following as the symptoms of stone.

" Calculosi vero his indiciis cognoscuntur: difficulter urina redditur paulatimque, interdum etiam sine voluntate distillat; eadem arenosa est; nonnunquam aut sanguis, aut cruentum, aut purulentum aliquid cum ea excernitur; eamque quidem promptius recti, quidam resupinati, maximeque ii, qui grandes calculos

* It is right to observe, however, that, as regards medical science, this is still a useful sort of knowledge, and very easily acquired; indeed, any person out of the profession might very easily obtain it at very little cost either of time or trouble.

habent, quidam etiam inclinati reddunt, colemque extendendo, dolorem levant: Gravitatis quoque cujusdam in ea parte sensus est, atque ea cursu, omnique motu, augentur. Quidam etiam, cum torquentur, pedes inter se, subinde mutatis vicibus, implicant." I *had* prepared copies of the symptoms of this complaint from different lectures, to show how little they varied from the above description. It is sufficient however to observe, that the foregoinig is a good general account, and includes most of the characteristics of the disorder; for even that increase of suffering which, in calculous patients, so frequently accompanies the ejection of the last drops of urine, does not occur without exception, whilst, as I have elsewhere* remarked, it attends other affections. Now, with regard to the general health, as affecting local diseases, Celsus seems to have been well informed; and, on some points, I confess that he appears to me to have been rather in advance of the majority even of the present day. Of porrigo he says :

" Ac neque sine aliquo vitio corporis nascitur, neque ex toto inutile est. Nam bene integro corpore non exit: ubi aliquod in eo vitium est, non incommodum est, summam cutem potius subinde corrumpi, quam id quod nocet, in aliam partem, magis necessariam verti."

Now all I mean to say, with regard to medical science at the time of Celsus, as compared with that of the present day, is, that, although in the latter some improvement may have taken place, yet it is very little, and certainly bears not the smallest proportion to that which has been effected in anatomy.

A very capital error in anatomical investigation is seen in that regard which has been paid to all endeavours to make out the ultimate arrangement of matter—minute anatomy, in the emphatic sense of the term. No field can be more unprolific, since it is scarcely conceivable that any mechanical arrangement could unfold to us the laws of life, any more than the mechanical figure of the various utensils employed in a laboratory could develop to us the laws of chemistry. That species of anatomical investigation which has for its object the detection of the distribution of particular tissues, as shewn in the *General* Anatomy of Bichat, is a very different affair; for, if particular tissues have particular modes of carrying out the laws of the animal economy, it is obviously of great interest to identify those tissues when they are

* Practical Treatise on the Urethra, &c.

situated in different parts of the body. It materially assists us in understanding, and even in predicting phenomena, in enabling us to refer them to some law by which they are influenced in common. Thus, if I know the changes produced in one part occupied by a particular structure, say a mucous membrane, *cæteris paribus* I know what to expect in another structure of the same kind, though I may never, in that part, have seen any of them before. But, besides this, it suggests generalizations of another kind, in relation to what I shall have to describe when I speak of the Sympathies of the body. Generally speaking, the fault of anatomical investigation has been, that the eye has been too much employed, the intellect too little. In other words, the knowledge required has been sought for too exclusively in the physical characters of parts, rather than in their physiological relations, in the enlarged, and philosophical sense of that term; as if, so to speak, there were no other physiology but that derivable from investigations of ultimate structure.

To some departments, indeed, of *Surgery*, Anatomy has closer relations; and accordingly we find that such departments evince a corresponding degree of improvement: I refer to the operative part of surgery*, the whole of which has been undoubtedly very much improved, not only by the simplification of operations already known, but also by the invention of others more efficient and less severe than those formerly employed for the accomplishment of the same purposes. But, even here, the improvements have arisen more from a philosophical consideration of obvious facts than from minute investigation of ultimate structure. Moreover, advancing surgical science has rendered operations themselves comparatively an inferior branch of surgery. We feel that the art of tying an artery, or of removing a limb, is but a poor substitute for the prevention or the cure of the disease. Although operative surgery (from the ignorance of the public as to its real claims, from its actual importance in the present state of science, and from the high scale of remuneration justly, perhaps, allotted to it, if not as being a high test of skill, yet as drawing largely on our time, and as being productive of much anxiety) possesses a rank far above

* In fact, more time seems to have been bestowed on endeavours to find out how we may safely remove diseases by mechanical measures, than how we should prevent their occurrence or remove them by aid of the powers of nature. We have too often, indeed, been seeking how we could most safely cut the knot, which it is our higher calling to endeavour to untie.

its legitimate pretensions, still the philosophical surgeon is no longer content to know how to remove a disease by separating it from the body. That enlarged cultivation of surgical science, which demonstrates the dependence of all local diseases on the state of the general frame, which in fact has rendered the purest surgical case a medical one also, and which has emphatically and for ever established, not only the connection, but the Unity, of surgery and medicine, has opened new fields to our ambition, and has taught us to aspire at the prevention of diseases which we are as yet unable to cure, and at the cure of those which we have hitherto been accustomed to remove by the knife, by the judicious regulation of the powers of the animal economy. But these objects can be achieved only by the progress of our knowledge; the consideration, therefore, of the means whereby such progress may be effected becomes, not only a legitimate feature, but a principal object of a surgical discourse.

The position of a surgeon at the present day may be thus illustrated: Having arrived at the discovery that local diseases, and indeed all local processes, depend on certain conditions of the general economy, he is eventually led by necessity to consider how he can ascertain its conditions, and how correct those which are disordered. This is *in fact* emphatically the object of the practice of medicine: but, instead of securing the aid he seeks, from what he may have been led to regard as a science, he finds that he can with no certainty obtain such assistance. He finds a complicated sort of art, which has scarcely any fixed principles; which can with certainty neither predict any phenomena, nor explain the failure of such prediction. He finds that bleeding, calomel, blistering &c. are employed in one complaint; bark, steel, and wine in another, opium, digitalis, squills, &c. in a third, and so on; but he finds no well-ascertained laws to which the practice can be referred. Disposed to concede any point, that a physician can have the smallest pretensions to claim, he still finds that, for the most part, the practice of medicine consists of an art, in which certain effects are, in a given number of cases, produced by certain means, on grounds, for the most part, in the highest and best sense, but rational conjectures, and conducted so little in the spirit of an inductive philosophy, that, whether his means produce the effect desired, or wholly fail, he is alike unable to refer either the one or other to any law of nature. He feels, therefore, at once, that, if he is to improve his own science, and this by a knowledge of what

is called the practice of medicine; that he must endeavour to study it in a manner calculated to improve such a state of things; since, although he may for the time avail himself of rational conjectures, a man who has arrived at such a point, will never be content with any conjecture as a substitute for science; which is satisfied with nothing less than at least a constant endeavour to find out the laws by which the phenomena of the body are governed.

In inducing you to consider of the mode in which you may best cultivate medical science, I shall endeavour, in the first place, to shew you that the improvements which have hitherto taken place therein, have resulted, for the most part, from a cautious and philosophical observation of obvious phenomena, and from such reasonings on them as were suggested by an enlarged exercise of common sense, or, if you will, an inductive philosophy.

Before, however, we consider the foregoing remark, in its application to *medical* science, it may be useful to refer to some few of the more important discoveries which have been made in other sciences, the extraordinary progress of which naturally invites this kind of examination. For if it be true that one science is in advance of another, it is obviously advantageous to that which is behind, to observe the means by which such advancement has been made.

If we find the same instrument working with great success in one direction, and making but little progress in another, the defective operation of that instrument (which is here, in fact, the mind) must be attributed, one would think, either to the inefficient manner in which it is employed, or to the stubbornness of the material on which it acts. Of all branches of human knowledge, whether we regard the sublime nature of its object, or the success which has attended its cultivation, Astronomy stands preeminent: it forms an all-surpassing monument of human intellect; and presents, in a very striking point of view, what appears to be the true element of wisdom; namely, a vast sum of knowledge, which bears unchanged every kind of test that we can apply to it. It is interesting also, to reflect, that the demonstration which it affords of the power of human intellect, impresses on it, at the same time, the truest perception of humility. For whilst no one has achieved more, absolutely, than the astronomer; no one has arrived at the same conviction of how little this is, as compared with that of which he is ignorant.

Now it will be granted, that in the whole range of this science, nothing has had a more important influence, than Newton's discovery of the law of gravitation; by which, he was enabled to demonstrate, that the falling of a body to the earth, and the courses and positions of the heavenly bodies, are the results of the same principle. It is stated, and with considerable probability, that the reflections which led him to this discovery, arose on his observing an apple fall to the ground, while sitting in his garden in the country. You could not imagine a fact more simple, more familiarly, more universally known, than such an occurrence. There are few things which suggest themselves to us, capable of being compared to it in these particulars; yet its simplicity is not more remarkable than the grandeur of the result to which it led: and the fact that I wish you more especially to bear in mind, is, that as the most important discoveries often arise from the philosophical observation of apparently very simple facts; so this discovery, of all others, as it would appear, most difficult and most improbable, arose out of a fact most obvious and most simple.

The story of the apple has been doubted*; but, so far as I can see, without sufficient reason: it is related on the authority of a friend and contemporary†, and attested by a relation‡. It is true that Kepler, Bouillaud, and others, had conceived that the same principle influenced, in some way, the gravity of the terrestrial, and the motions of the celestial bodies; and that astronomers, generally, were contemplating some such connection; but this, instead of tending to shake the force of the direct evidence to which I have alluded, adds to it all the force of probability; for, without preparation, it seems inconceivable that an apple falling to the ground could suggest such sublime deductions. But if we can

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* I perceive, in a book lately fallen into my hands, "Whewell on the History of the Inductive Sciences," that a view, precisely similar, as I understand it, is taken of the relation which the simple fact in the text bears to the discovery: but, lest I have not caught the author's meaning aright, I refer the reader to the second volume of the work in question, p. 157, et seq. Nobody, I presume, ever dreamt of any obvious phenomena leading to any discovery whatever, except through the instrumentality of that engine whose special function it is to make out the real relations to the laws under which they occur: but to the philosophical enquirer it is of the highest interest to be persuaded that, as Nature's laws are in general simple, so the most universal are daily exemplified in the most common, easily perceptible, and even striking phenomena.

† Pemberton. ‡ His niece. Voltaire's Elem. of Philosophy.

conceive a great mind previously directing its energies to the connection of gravity and the laws of gravitation generally, we may imagine that the apple might indeed connect that chain of reflection, the first link of which it may still have been inadequate to form. When we contemplate this law in all its relations, we feel quite lost in its immensity. To conceive that it is so universal that no atom in nature is not, in all probability, under its influence; to reflect that the planet we inhabit, and the countless worlds which surround us in space, owe their positions and regularity to the same principle; that thousands and thousands of vast orbs, floating, as it were, in boundless space, should pursue courses of millions of millions of miles with a rapidity of which our external senses allow us to form no kind of conception; and yet that their courses should, in many instances, be judged of by man; and that they should be shewn to move in paths or orbits with a predicable regularity; that even the weight of several of these stupendous creations should have been ascertained; and this by man, the diminutive creature of another planet, thousands of miles distant from the nearest of the bodies in question, and probably bearing to many of them, little more proportion than that which a grain of sand bears to the globe he inhabits;—these, and such like reflections, so overwhelm us with wonder and amazement, as to disturb the calm contemplations of philosophy, and to convert the mild glow of an humble and grateful piety into the intemperate ardour of enthusiasm.

Before, however, we leave astronomy, I should like to mention the following circumstances:—1st. that its objects have, at all times, not only invited, but in some degree compelled observation; 2ndly, that no science has derived so much assistance from having had investigators, who were so provided for, that their whole minds might be devoted to the science, without being diverted by any necessity of applying them to the ordinary wants of life; and, 3rdly, that such provision was, in the earlier ages, generally rather the result of ignorance and superstition than of any love for science, was in fact the product of a belief in judicial astrology. You will hereafter see that the proceedings of the ignorant and the credulous, did we make proper use of them, might also be often made conducive to the advancement of medical truth*.

* In this way, phenomena resulting from the merest quackery, may be often rendered conducive to the progress of truth. The nostrum vendor not unfrequently

You will think, no doubt, that I have said enough of gravitation for the present; we will now, therefore, consider the origin of an instrument very closely bearing on astronomical science; I mean the telescope* Now, here again writers do not exactly agree in detail; but the main fact seems certain, that the first telescope was suggested to its inventor, an optician of Middleburg, in Holland, in consequence of having looked at a distant object through two lenses, at some distance from each other, and having been struck with the fact that the object became magnified. The celebrated Galileo constructed a telescope about the same time; and if he had heard some vague reports concerning the discovery at Middleburg, this seems to have been the only assistance of which he could have availed himself. Indeed, on this account, and from the circumstance that Galileo's was the more perfect instrument, some were led to attribute to him the honour of the discovery. Spectacles had been employed as far back as the beginning of the fourteenth century; but there seems no question that the first *telescope* was made by the optician at Middleburg, at the latter end of the sixteenth, or very early in the seventeenth century. I cannot here enlarge on the importance of this investigation: perhaps, indeed, its value cannot be properly estimated, except by the

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gives rise to circumstances, which shew the importance of operating on different parts by means of the sympathies which exist between them, in a manner hereafter to be explained. The proceedings also of the homœopathist have a tendency to open another channel, by which the public may perceive what we often in vain endeavour to demonstrate to them—viz. that cautious living will do a great deal, without any medicine at all; and that, without this, medicine is frequently of no avail whatever—nay, that it may readily exasperate the evils which it is its object to remove. But, at present, this last species of quackery is too much in vogue perhaps for the still voice of reason to be heard amidst the clamours of credulity. By and by, however, patients may be induced to relinquish their infinitesimal doses of medicine, whilst the care of their habits is continued; and this will probably help to enligthen them. But the truth, however humiliating, cannot be concealed, that there is scarcely any assertion so absurd, but that we find it difficult, and, as regards the public, impossible to disprove it. Practically, this is a severe, but just retribution, on those who would make science a mystery, whilst it powerfully impresses the low condition of the science. The remedy is, to improve the science, and to disseminate a knowledge of its elementary principles. This is the only plan by which common sense can really be opposed to ignorance and credulity.

* The endeavours which some have made to trace the telescope to Roger Bacon, Baptista Porta, and others, are regarded by writers on this subject to have failed.

The first *reflecting* telescope was invented by Sir Isaac Newton.

astronomer. I may, however, mention that its first fruits were no less important than the discovery of the satellites of Jupiter by Galileo. Here you have another discovery, exercising the most powerful influence on the progress of the most perfect of the sciences, arising out of the observation of a very plain and obvious phenomenon. I might, indeed, also have observed, that spectacles are said to have been first made in consequence of a similar circumstance. It may be well, before quitting the subject of the telescope, to remark that one of its most important improvements, namely, the rendering it achromatic, was made from considering the *obvious* structure of the eye by Mr. Dollond*. Even those discoveries which have been made from less obvious or less frequent phenomena, have generally been found to exhibit some striking exemplifications on the surface (if I may so speak) of Nature. The rainbow, as an illustration of the composite nature of light, is a glaring instance of this kind. I have here adduced, in support of my position, one or two instances of the most striking character, because, while they all relate to a science which is the most advanced, the case of gravitation in particular affects the whole circle of human knowledge. Other branches of science, however, afford examples of a similar description. In reflecting on the botanical system of Linnæus, imperfect though it may be, it is impossible not to feel great pleasure in observing so many interesting results obtained by the observation and comparison of such obvious phenomena. What is there more attractive in a plant than its flower? From regarding any number of flowers, even at a distance, we derive sensations of cheerfulness and delight; and, when we are close enough to examine them, we perceive, in the diversified manner in which their stamina and pistils are disposed, in the beautiful and varied arrangement of their colours, in the delicate pencillings by which they are adorned, and in the delightful fragrance which many of them exhale, so many circumstances facilitating, inviting, and even, as it were, commanding our observation. All this is true, when spoken in relation to the exercise of the naked eye; but, if we extend the range of vision by a magnifier, of even moderate power, these inducements to attention become indefinitely multiplied. Now, on the differences

* Euler, however, had inferred the possibility of a combination of lenses which would not colour the object, from the human eye, where it is evidently accomplished.—Whewell's Hist. of the Sciences, p. 362.

on the number of the stamina and pistils, and their relations to each other, and to some other parts—not so obvious, indeed, but to the examination of which they appear almost necessarily to lead—the Linnæan arrangement is founded. Even the natural classification of Jussieu, though more perfect and comprehensive, and requiring more labour, yet primarily depends on the investigation of structures, not always, perhaps, equally striking, but still easy of observation. The strong conviction which I entertain of the utility of insisting, thus at the beginning, on the importance of the observation of common phenomena, may perhaps render me tedious; but I cannot quit the subject without noticing one or two points which, if they have not a more important, have perhaps a more interesting bearing on medical science.

A circumstance of no less common occurrence than a pump getting out of order, led to the discovery of atmospheric pressure. The water of a pump having fallen below its usual level, Galileo sent for a pump-maker to repair it. The pump-maker, however, could find nothing wrong in the pump; but said that the water would not suffer itself to rise above a certain height. Galileo is said to have attributed this to the attraction of the piston; which, when the water had reached about thirty-four feet, was overcome by the gravity of that length of column. Torricelli, his pupil, was the discoverer of the true explanation of the phenomenon, namely, the pressure of the atmosphere. Of course, he tested this by experiment; for, if atmospheric pressure would raise a given column of *water* to a given height, it would necessarily raise any *other* fluid in a degree proportionate to its gravity. This he proved with regard to mercury; and thus the fact was established*. I believe it will be found that no branch of science, of the history of which we have any accurate account, fails to furnish illustrations of the proposition which I am endeavouring to impress on you. Electricity, in its relations to every thing around us, is a subject of all-absorbing interest; and, since we have been taught to identify it with galvanism and magnetism, and to view it in connection with its bearings on the chemistry of Nature, has opened fields to the philosopher; the cultivation of which has

* About the year 1640. Amongst other important results of this discovery, the barometer was its direct product, and the influence which atmospheric pressure has on boiling points of liquids, and various other phenomena—in fact, the science of pneumatics.

already produced the most valuable fruit, and which promises a yet more abundant harvest in the discovery of principles and relations in Nature, at present beyond all idea or calculation. Among the most distinguished of those to whom science is thus indebted, it is an agreeable thing to find men, the arena of whose labours has been the Royal Institution of our own country. Now, if we trace back this science, we shall find that the ancients knew very little about it: that it is one of modern origin; and that as early a step in its progress as we can discover, worth mentioning, was made in 1600; when a treatise on the subject was published by Gilbert, in this country; that, in fact, nothing material took place till the discovery of galvanism, by the man after whom it is named; namely, Galvani. Now, the discovery of galvanism, important as it may be, was the result of a very striking fact; and that fact itself, in the case in question, was accidental. It has been well observed, however, that "discoveries, apparently the result of accident, always, on closer examination, imply the exercise of profound thought." This is, indeed, true, and it would be unreasonable to suppose it to be otherwise, or that the laws of Nature should in any case be intelligible without a proper use of the instrument by which alone they become so—that is, the mind*. But still the

* Long after I had written this discourse, I was much pleased in reading the following passage in Mr. Whewell's work on the History of the Inductive Sciences:—"It has been well said, that true knowledge is the interpretation of Nature, and that it requires both the interpreting mind and Nature for its object—both the document, and the ingenuity to read it aright—thus, invention, acuteness, and connection of thought, are necessary on the one hand, for the progress of philosophical knowledge, and, on the other hand, the precise and steady application of these faculties to facts well known and already conceived. It is easy to point out instances in which science has failed to advance in consequence of the absence of one or other of these requisites: indeed, by far the greater part of the course of the world exhibits a condition thus stationary with respect to knowledge. The facts, the impressions on the senses, on which the first attempts at physical knowledge proceeded, were as well known long before the time when they were first turned to account, as at that period. The motions of the stars and the effects of weight were familiar to man before the rise of the Greek astronomy and memechanics; but the "Diviner mind" was still absent. The art of thought had not been exerted, by which these facts were bound together under the form of laws and principles; and, even at this day, the tribes of uncivilized and half-civilized man, over the whole face of the earth, have before their eyes a vast body of facts of exactly the same nature as those with which modern Science has built the stately fabric of her physical philosophy; but, in almost every other part of the earth, the process of the intellect, by which these facts become science, is unknown. The scientific faculty does not work,—the scattered stones are still there,

fact, on which the mind's power is exercised, is generally simple, and requires nothing but the most ordinary capacity for its perception. Its relation to the law which it illustrates, is another affair, as was the case in the example before us. Galvani's* wife, being indisposed, had been ordered to take frogs by way of diet; and one of them lay on a table near an electrical machine, which was in action. A pupil of Galvani's happened to touch a nerve of the frog's leg with the point of a knife, when instantly the limb was thrown into convulsions. This occurrence, which was mentioned to Galvani by his wife,—for it appears that he was not even present when it took place,—excited him to an investigation, which he immediately prosecuted with ardour. I cannot go farther into this part of the history of electricity, than to say that the result of the enquiry, being further developed by the reasonings and experiments of Volta, led to the invention of the battery which bears his name. Indeed, galvanism is thus often called Voltaic Electricity. I shall be obliged to refer again to this subject; but its importance may be gathered from the fact, that it was by the agency of the Voltaic pile or battery that Sir Humphry Davy first shewed the influence of electricity on chemical affinity; and that we have been led to the knowledge of the fact, that all chemical actions are, indeed, electrical phenomena. When we consider the changes in our views resulting from this conclusion, and venture to glance at the consequences to which it may yet lead, we scarcely believe it possible, any more than with regard to the discovery of gravitation, that effects so stupendous, can have arisen from such small beginnings.

Examples of a similar kind might be indefinitely multiplied; but it is now time to look a little homewards, and apply our enquiries to matters more directly connected with medical science. We shall not fail to find plenty of facts for the purpose; and, for my own part, I should think, were every one of them stated, that the requisite space would be well occupied; but, as you may probably be of a different opinion, I shall here select one or two only of the most striking, as sufficient. Let us, in the first place, consider Harvey's discovery of the circulation of the blood. We

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but the builder's hand is wanting:—and, again, we have no lack of proof that the mere activity of thought is equally inefficient in producing real knowledge."—Whewell's Hist. of Med. Sciences, vol. i, p. 778.

* Galvani was Professor of Anatomy at Bologna, 1760.

shall derive much instruction from the consideration of this subject, and find that it places, in a striking point of view, the superior utility of the *careful* examination of obvious phenomena, as contrasted with that minute search into intimate structure, to which anatomists appear to be so partial. The discovery of the circulation arose out of the contemplation, not only of a very obvious fact, but of one which had become well known; namely, that the superficial veins were furnished with valves, and that the heart was provided with a similar mechanism. Now, a considerable time before this, these valves had been observed by Father Paul and Sylvius*; and besides, the passage of the blood through the lungs had been pointed out by Michael Servetus; and even the valves of the heart had been described by Realdus Columbus†.

Various conjectures concerning the circulation of the blood had been made in ancient times, but nothing that even approached the truth, until nearly the time of Harvey, when the observations of the two authors whom I have just mentioned, to which may be added those of Andreas Cæsalpinus‡, bore so closely on the truth, that we cannot help wondering that neither of them discovered it. Michael Servetus had certainly correct ideas as to the transmission of the blood through the lungs; whence, he says, it passes to all parts of the body. He was a Spaniard by birth, being born, in 1509, at Villanova, in Arragon. Unfortunately, he became a theological disputant, and, ultimately, a victim of religious fanaticism. He was burnt at the stake, at Geneva, in 1553, consequently at the age of forty-four. Realdus Columbus gives a very clear description of the valves of the heart, and of the transmission of the blood from the right side, through the lungs, to the left; and thence, through the aorta, to all parts of the body. Andreas Cæsalpinus, who wrote immediately after Columbus, remarks, amongst other things, that if a ligature be put round a vein, the vessel swells on the side remote from the heart. Now, Fabricius ab Aquapendente, although he did not discover, appears to have been the first person who particularly described the valves of the veins, of which he had been told by Father Paul; and the celebrated Harvey was one of Fabricius's pupils. I mention these things merely to shew that the discovery of Harvey was, after all, a clear and simple deduction from facts which were previously known, and, indeed, of obvious character. The discovery

* About the end of the 16th century. † 1559. ‡ Born at Arezo, in Italy.

of parts so palpable as the valves of the heart, or even of the veins, by men in the constant habit of anatomical pursuits, cannot be regarded as matter of much wonder. They were not only objects of sight, but such as required no painful or industrious exercise of it: the application, however, of the fact of their existence, was an intellectual process, and was Harvey's discovery. And although, as with regard to many other discoveries, we now wonder that the inferences drawn by Harvey were not perceived before: the very circumstance of their having escaped previous observers, may enable us to appreciate the order of mind which did at length deduce them. I need not go into the investigations of Harvey on this subject; my object is, merely to shew you the facts on which they were founded. In comparison with such a discovery, how insignificant do the labours of those anatomists appear, who have distinguished themselves by minute or microscopal observations, as Ruysch, Malphighi, or Lewenhœck!*

In selecting instances from surgery, which shall most happily combine simplicity in the views whence the improvement originated, with importance in the result; I cannot do better than cite the operation for aneurism, first carried into practice by John Hunter; because, whilst an improving science bids fair to circumscribe, within very narrow limits, this (I mean the operative) part of surgery, the causes of aneurism render it extremely improbable that the occurrence of that serious malady will be materially diminished†. To understand this fully, you should know that aneurism, which consists in the enlargement of an artery, or, more commonly, in the giving way of its internal coat, is seldom the result

* As contrasting the two methods of observation, viz. that of obvious facts, whether of structure or function, with minute investigation of structural arrangement, the application to our professional researches of the following observation of Lord Bacon is well worth our consideration:—"Nor is it a less misfortune that men, in their philosophic contemplations, bestow their time in discovering and treating the ultimate principles, or last resorts of Nature, whereas all utility or power of acting lies in the midway: but, in general, men cease not to abstract Nature until they arrive at potential and uninformed matter; or, until they divide her so far as to come to atoms: which things, though ever so real, make but little to the advantage of mankind."

† I do not multiply examples of this kind, drawn from professional sources, for two reasons: first, because it is very easy to lose sight of the argument in a superabundance of illustrations; secondly, because they will be described in their proper places, and in future parts of the work refresh the memory and induce a sustained impression of that which I am desirous of conveying in these discourses.

of any single cause; or, if it be, the cause is one of such a nature as not to be perceptible, in time, to afford us any chance of its prevention. An artery may thus give way as a direct consequence of the force with which the heart impels the blood into it, or from progressing disease of its coats, rendering it at length unequal to the ordinary momentum of the circulation; or, occasionally, from sudden extension in violent motions of the body, or from being unfavourably circumstanced as to position; such as one which, from the occupations of the individual, may keep it almost habitually in a state of curvature, in which the force of the circulation, instead of acting in the direction of the axis of the vessel, is exerted against its sides, as in those who ride much, as post-boys, &c. Either of these causes may act separately; but, usually, they are more or less combined.

The old operation, which consisted in cutting into the aneurismal tumour, turning out the blood, and tying the vessels above and below, was not only extremely severe, but very generally, indeed, fatal. Now, experience had shewn the following facts,—that, in some cases, the retardation of the current of blood through the aneurismal sac had produced the cure of aneurism; and, further, that in tying the artery close to the aneurism, it was frequently found to be diseased. It was a very obvious inference from such facts, that if a ligature were placed on the artery at a reasonable distance from the disease, it would be more likely to be placed around a sound portion, whilst it would very much retard, if not entirely impede, the course of the blood through the cavity of the aneurism. Mr. Hunter, acting on these considerations, tied the femoral artery for an aneurism in the ham: the proceeding was entirely successful, and now forms, perhaps, one of the simplest and best of our operations. Few operations take less time, few are attended with less suffering, and of those comparable with it in importance, none are more generally successful.

But, as I presume enough has been said on this topic, I will now come to the last instance; and which, in my opinion, as regards professional considerations, is the most important of all,—the institution of that improved surgery which has raised an art of, comparatively speaking, very mean pretensions, into a science,—the surgery which teaches that the diseases of parts of the body are but phenomena manifesting the condition of the whole—the exposition of the "Constitutional origin and treatment of local diseases," by Mr. Abernethy. The whole pheno-

mena by which the relation between local diseases and the general health is established, are of the most common and simple description. They are within the range of every comprehension, and many of them are familiar to the most ignorant. The more we consider the facts, the more are we struck with their number, their glaring nature, and the luminous manner in which they point to the conclusion.

It would not be correct to state, that general views of the connection of the general health with local affections, had not been occasionally entertained long before. Celsus appears to me to have had exceedingly good *general* notions on this subject; and the quotation which I have given from him with regard to porrigo, shews that he even possessed something more. Neither is it by any means uncommon to find old surgical writers summing up a catalogue of remedies, by saying that if these are unsuccessful, then some physician should be consulted, as "the blood is in an impure state," or some equivalent expression. But if we can thus trace a faint recognition of the connection of local diseases with the general health, it is all we can do. We never find it brought to bear, with any perception of its real importance, on the treatment of diseases. Whatever appreciation it has obtained, appears to have been more amongst persons who belonged rather to the public than the profession. Mr. Abernethy was the first person to bring the vast multitude of facts to bear on the practice of surgery.

The philosophical character of Mr. Hunter's labours would, no doubt, make a sensible impression on a mind like Abernethy's; on which, also, the laborious discourses which he is said to have delivered on the sympathies of the body (with the sole effect of proving, as Mr. Abernethy himself said, that the whole body sympathized with all its parts), would not probably be lost. Indeed, Mr. Abernethy very soon applied this fact, and various others, to their proper uses; and, in carrying into practice the principle to which they led, may be said to have revolutionized the practice of surgery. A comparison of the state of surgical science at the time which preceded him and the present, would be the true mode of estimating our debt to Mr. Abernethy: nor are our learned brethren, the physicians, wholly exempt from obligation to him. When Mr. Abernethy first broached his notions, people, very charitably, no doubt, said he was mad. I do not believe that they meant that he was insane, but that his notions were wild, visionary, and so on.

Now things are changed. We now neither doubt of the truth or importance of the connection between the general health and local diseases, nor between these and the digestive functions, to which Mr. Abernethy was erroneously thought to limit his views*. We now only differ in degree; we are divided as to the *extent* to which attention to the health in general, and the digestive organs in particular, should be carried; as if the admission of an influence exerted on every disease did not, as a matter of common sense, absolutely command the most refined, unwearied, and philosophical investigation of it in our power. You will have opportunities of judging how this investigation has been conducted, and of the extent to which it has been characterized by the principles of inductive reasoning; you will then be surprised rather at the progress which medical surgery has made, than that it should *not* have advanced more rapidly.

To return to Mr. Abernethy. His facts are not only not abstruse, obscure, or difficult to perceive, but they are of the most trite and ordinary description, not only such as must have been known to every professional man, but to most of the public also. These facts, and a multitude of others, not only establishing Mr. Abernethy's views, but also enlarging and improving their application in practice, it will be my business to bring forward hereafter. Here I only say so much as may serve to convince you that it is vastly more important that you should observe well, and carefully reflect on obvious phenomena, than that you should be intent on the discovery of those which are new, much less such as are to be sought for, only in minute arrangements of structure.

Having said thus much on the advantages derivable from the observation of common or frequent phenomena, I would endeavour, in the next place, to give you a few simple rules for the mode of conducting your observations.

Now, as a preliminary step, I wish to establish in your minds the conviction that (as Lord Bacon expresses it) Nature "has a meaning in everything she does:" in other words, that there is no occurrence, however common, which is not the exemplification of some law of Nature. As the operation of one law is usually found

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* If it were said that Mr. Abernethy limited his *practice* to attention to the digestive organs, it would, as applied to his Medical Surgery, be much nearer the truth; but to say that his *views* of the causation of diseases were restricted to the influence of the digestive organs, is neither true nor just to his memory.

to accomplish an infinity of ends, so the discovery of any one exemplification of it usually leads to the explanation of many other things of which we were previously ignorant. Attention to the habits of animals strongly suggests to us the constant operation of laws, whilst it furnishes numerous examples of the objects which they accomplish. When we see birds in rapid flight, soaring in the air or coursing backwards and forwards over fields, meadows, and streams; or the numerous insects which flutter about us on a summer's morning, or which, in such varied forms and with such different velocities, run across our path; we are apt to take but little notice of either. But the case is very different when we consider that what at first had the semblance of sport, play, or accident, is, in fact, the exemplification of various instincts—that the birds are either flying long distances in search of food, or returning home afterwards, as happens with the rook or pigeon, watching their prey or in chase of it, as the hawk, or carrying food for their young, or materials for their nests—that insects too have their objects; that the flight of the butterfly, apparently so irregular, is nevertheless unerring; that she not only seeks her own food, but lays her eggs, in many cases, on a place where there would be no food for her young, did it not happen, in many instances, that they feed on articles which the parent never touches. Insects which are seen running across our path generally afford information, if we watch their movements. They either inform us of their domicile, the nature of their food, or some other circumstance equally interesting. I once watched an ant, near the sea shore, carrying, as that insect is well known to do, a weight considerably greater than herself. Her way was to the last degree rugged, and, as regarded her size, one would say mountainous, as she had large masses of smooth stone and rough chalk to ascend and descend, in every possible variety of inclination. Nothing could be more interesting than her modes of operation; and most of them were perceptibly in accordance with some well-known scientific principle. But is it possible not to feel interest in the sublime truth arising out of such simple phenomena? You need not be in the country to observe animals. The domestic cat and the house fly are exceedingly interesting. How beautiful is it to see, in the prehensile playfulness of the kitten, the education necessary to her becoming the successful mouser, or to watch the common house fly, either in his walks with his air-pump feet upon the ceiling, or in his rapid and angular flight, which would seem to indicate, that, a prey himself, he is also predacious; and may be

pursuing, aided by his complex eye, objects to us invisible. Not a vapour that arises from the earth, not a drop of rain that falls on it, not the slightest breeze that blows, neither the rest nor motion of a particle of dust, neither the heats of summer, the cold of winter, nor the genial warmth of spring or autumn, occur but in obedience to certain laws. In our own persons, we may be assured that, whether we walk, stand, sit, eat, drink, feel ill or well, happy or miserable, think, compare, judge, feel, hear, or see, or in fact do anything,—we may be assured that the powers through which we do it are regulated by laws; and that, although one law always explains a variety of phenomena, yet that one *act* will frequently have reference to more than one law. In short, whether we regard the skies above us, the earth beneath, the atmosphere around it, the waters on its surface, or that which is beneath it, we never fail to see everywhere something of the highest interest. Every law of nature is a problem; every phenomenon may be regarded, not merely as its product, but as a key to its solution: and it is through a multiplied solution of such problems that Philosophy can alone establish her high calling, her true position, which shall demonstrate that Religion and Philosophy lead to where Wisdom and Piety meet in a common conclusion.

Now to whatever of the phenomena of nature our observations be directed, the result will entirely depend on our mode of conducting them. I could not give you full instructions on this point unless I were to write a kind of Novum Organon, which is not compatible with the accomplishment of the several other objects of this work*. I would advise every one, however, to study Lord Bacon. His Novum Organon cannot be read too often, nor studied too much; for, while what he inculcates is, as it appears to me, nothing more than the patient and unbiassed exercise of common sense, still he teaches an enlarged exercise of it, accompanied by so acute a circumspection as to be by no means so easy as you might be disposed to imagine. I shall, however, endeavour to give you a few simple rules, which may not be without their use to you in conducting your observations.

In considering a fact, it is of the utmost importance that the

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* See Preface.

mind should be unbiassed by any preconceived notions. These constitute what Lord Bacon treats of under the term Idols in his Novum Organon, though perhaps the greater part of our prejudices may be resolved into the influence of authority. If we examine our minds with great severity, we shall find that there are few subjects on which we have not some notion or other, without being able to answer the question, From what facts do I deduce such an opinion? Many erroneous notions are frequently the result of education; they are imbibed very early, and often become indelible; as Sir Thomas Brown very justly says, in a quotation from Lactantius, "Primus sapientiæ gradus est, falsa intelligere." Lord Bacon expresses the state of mind adapted for scientific investigation very happily, when he says, "The kingdom of man founded in the sciences can scarce be entered otherwise than the kingdom of God; that is, in the condition of little children." Nothing should be admitted into the consideration that is not as well ascertained as the fact we are supposed to be considering. Now, freedom from prejudices is very easily seen to be necessary to correct thinking; but it is by no means so easily obtained. The first difficulty in our way arises from authority, which exercises such extensive influence on the formation of opinions, that, where one man thinks for himself, thousands bow to authority; in fact, allow others to think for them. Hence the error of one man becomes the error of thousands. In the case of Aristotle, it became the error of millions. No man broached more absurdities than he: no one ever possessed the same kind of influence over the minds of men. His authority actually kept science from progressing for ages; and the persecution of Galileo, which was, so to speak, but an occurrence of yesterday, although it emanated directly from the Church, was, in its origin, due to the errors of Aristotle*. In fact, as regards Authority in general, the whole history of human knowledge strikingly illustrates the truth and importance of the following reflection:—that there never was a proposition so absurd, or a theory so untenable, but that it met with some supporters; nor any truth, however simple, luminous, or useful, which had not, at its first discovery, to encounter opposition.

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* I am not insensible of the successful powers of generalization displayed by Aristotle; nor do I mean to refer the long reign of error entirely to the influence of his authority; but still there is no single instance, which illustrates the proposition, comparable to that of which this philosopher is the example.

The influence of Authority originates from many causes, the nature of which is exceedingly different; some of the more obvious may be briefly mentioned. From our cradle we are accustomed to the recognition of Authority in the necessary guidance which we receive from our parents in forming our notions of right and wrong; and habit induces us unconsciously to extend that which we have found right and safe in questions of a moral kind, by an easy transition, to matters of a different nature; questions involving a vast variety of dissimilar phenomena, questions on which we are assisted by no direct revelation, as in morals, but which, depending for their solution on the observation of laws only, require perception, reflection, comparison, judgment, in short the highest exercise of our reason.

Again, in the study of every science, the elementary parts are generally interesting. Charmed on the very threshhold of our studies, we are apt to over-rate the knowledge of our teacher (and in the confidence engendered primarily by necessity and secondarily by a certain number of facts which are demonstrable), to give credence to the opinions which may accompany them. But mark the result. Not one man in fifty arrives at what is called the completion of his education without feeling that he has many things to unlearn.

But were reliance on scientific authority always to result from so good a disposition as that which would found it on the tried experience of its moral excellence, or on the amiable confidence with which a pupil looks to his master, we might indeed excuse, however much we might still regret, its injurious influence on science. But the spring, the real source of reliance on authority, is neither so amiable nor so easily observed. On the contrary, it is deep and selfish: it finds an equivalent for the confidence bestowed in the blind indulgence of indolence, or in the gratification of some other equally selfish feeling. A reliance on the dicta of others is easy; familiarity with the accumulated labours of our predecessors is acquired without any other exertion than the careful perusal of books for the most part interesting. A vast quantity of intellectual fruit, called learning, is thus easily obtained, and brings with it a present fruition in the respect awarded to it by mankind, who seldom stop to discriminate between learning and knowledge. Contrasted with this, the investigation of Nature appears at first laborious; the record of facts, so long as their relation to the laws which they exemplify remains undiscovered, is a kind of drudgery at which the

mind is apt to revolt; and, although when the discovery is at last made, nothing can exceed the delightful elevation of the mind at viewing so vast a number of secrets unlocked at once, still, as the fruit is precious, so cannot it be acquired without exertion. Constant thinking is necessary. This kind of intellectual digestion is the only means by which the mind converts learning into knowledge. Facts are its food; the determination of their mutual relations, and the laws whence they emanate, constitutes its digestion. More learned men may have been useful compilers, but have seldom extended the bounds of knowledge. Accurate observers of Nature have seldom failed to do so. Nor does the admission of the greater power, resulting from learning and acute observation when combined, militate against the superiority of the latter considered singly.

But, whilst I would caution you against the undue influence of authority, I would guard you, on the other hand, from its indiscriminate rejection. Successful observers of Nature deserve our utmost study and attention; the most trivial circumstances regarding the education and conduct of their minds are to be considered with interest. Most men are capable of perceiving the value and importance, nay, of being surprised by the simplicity of relations which they would have been unable to discover. The real lover of truth will also study the proceedings of successful observers, with the probable advantage of discovering how they avoided various misdirecting influences by which our slowly progressing moral powers shackle or impede our intellectual faculties. I have above adverted to selfishness as one of the sources of our reliance on authority; and I need scarcely observe how often our reasoning powers are clogged by the dominant passion. Many men persuade themselves that they are searching for truth, when they are contending for victory; or when they are favoring their love of ease by hastening to a conclusion which they are not industrious enough to work their way to from safe and legitimate premises. Others persuade themselves that the relations of a fact must be so and so, not from a sincere conviction of the truth of their views, but because they support some favorite theory. In this way, success itself is apt to mislead a man; for when he has made out some true relations among phenomena, pride usurps the place of humility, and caution is laid aside in his haste to apply the law which he has discovered to phenomena which it does not explain: but facts well attested, whencesoever derived, are to be recorded.

Circumstances are often accidentally developed to men who are no great observers of nature; and if a fact be recorded without its true explanation, it is better that it be stated without any; as it thus becomes so far a more sure basis for reasoning, inasmuch as it is then less likely to be coloured in any way by the views of the writer. In this way, the observations of the most ignorant are often of great use. However, you will seldom find facts thus isolated; they are generally accompanied by some conclusion: and we have not only to consider the author's facts, but also whether they justify the conclusion he deduces from them. This leads us to determine what those relations are, which should exist between facts and the conclusion which we deduce from them. The fact should fully and satisfactorily account for the conclusion. It is not sufficient that there be nothing irreconcileable or contradictory between them; but their mutual relation should be one which the fact can be perceived to bear to no other conclusion, and the conclusion to no other fact whatever. Generally, any conclusion, or any explanation of a fact which involves much complexity, should be received with suspicion; because every truth we discover has no feature more striking than its simplicity. Any thing also which involves an exception to an apparently established rule, should be received with the same caution; true exceptions being so rare, that the existence of any may reasonably be doubted. Even the very remarkable exception which water seems to form to the general law of contraction on the subtraction of its heat, is attended by some difficulty. For although, at the freezing point, it occupies more space than when some degrees above it, yet at about forty degrees it observes the same law as other forms of matter. Therefore, as the laws of crystallization seem to give definite forms to the molecules of crystallizing bodies, it is quite conceivable that the molecules of ice may be so formed as really to forbid that closeness of adaptation which takes place in a fluid state. When the important results of ice being specifically lighter than water are considered, this view is far from improbable; and it would show that the expansion of ice was not in consequence of cold, but of some change in the arrangement of its molecules, causing them to occupy more space. A conclusion, to be the basis of any further reasoning, should be tested by repeated observation and experiment. Probability may exist on grounds less strict and determinate; conviction should rest on no other. A conclusion may be probable which naturally explains the facts; but still it is but probable. The two theories of

light, for example, explain, perhaps with tolerably equal success, the phenomena; but this very circumstance is a bar to our arriving at any conclusion as to the truth of either. Indeed, were we at all driven to a conclusion where two theories explain the phenomena equally well, the safer one would be, perhaps, that both of them are wrong.

To establish between facts and inferences the close relation which I have endeavoured to describe, is the great object of inductive philosophy: and, although the rules are of difficult observance in medical science, and not always easily to be followed in any; yet, in no science more than the medical, is it necessary to strive at the greatest possible approximation to them. In most other sciences, chemistry, for example, the phenomena refer to objects which, although they exhibit various changes in their relations to other existences, and in their own forms, can yet be placed under circumstances so identical, as to be made to observe determinate modes of action. Thus, if I wish to act on a piece of metal, any number of times, I can take it of the same weight, the same size; I can place it in the same temperature, in the same vessel; I can ascertain that it is of the same density, and influenced by the surrounding atmosphere in the same manner; or I can place it in vacuo; so that I have the strongest possible assurance that any new phenomenon results solely from the agent I myself apply to it; and thus I can ask of Nature the question intended, so as to limit its signification, and thus assure myself that my enquiry is the same, and that I have not made it under circumstances of a different nature, on different occasions. But in animals, and (from the superaddition of moral influences) especially in man, we have not the same opportunity of assuring ourselves that we have observed phenomena in any two cases under precisely the same circumstances. Original peculiarity of constitution, differences acquired from habit, age, or disease, the varying conditions of various organs, and the inscrutable operation of complicated moral causes, lead to such endless varieties in the condition of the nervous system, and constitute so many elements of change, which are unappreciable, that we can never be certain of placing the same person, twice following, under circumstances exactly similar. No wonder, then, that we cannot *as easily* arrive at conclusions by strict induction, as they can who pursue other sciences: but it is to be feared that the task, when its difficulty should have given rise to a corresponding increase of exertion, has been too often

rejected as hopeless; and that, *because we could not arrive at conclusions which were certain, we have not sufficiently striven at such approximations thereto as are really within our grasp.*

Further, it is demonstrable, that we have often rendered what was already difficult, impossible, by the mode in which the investigation has been conducted: neither need I say how often reasoning has been laid aside, and replaced by an avowed empiricism. Now, I do contend, that medical science can never progress unless we set to work in a different manner. I further contend, that the present mode of observation may be materially improved, as I hope to shew you in due time. Perhaps it will be more useful to spread, what I have to offer on this head, over the subjects to which it especially refers, than to go at length into it at present: still, as the subject is important, I may here illustrate a small portion of it.

Let us suppose some disease—say, for example, in the lungs. Now, this may be accompanied by certain phenomena; symptoms, as we call them. Let us also suppose, that, in a given number of cases, the disease has disappeared under the employment of bleeding, blistering, antimony, rest, and abstinence. Now it may still happen that we may remain in utter ignorance of the laws by which the disease had been engendered; nay, it may happen that our treatment has not included any attempt at their investigation. Should the latter have been the case, it matters not whether for 1800 or 18000 years; it not only explains why our knowledge is stationary, but it shews that it is impossible that it should be otherwise. But, to return to the case. We wish to enquire, at all events, to what agent the cure has been referred, however indifferent we may have shewn ourselves as to the mode of its operation: and here we meet with great difficulty, but it is chiefly of our own making. We have, in fact, employed a number of remedies simultaneously; each of which, for aught we know, might have been adequate to effect the object. Now, if the effects of remedies can, in any case, throw any light on the nature of disease, you will immediately perceive how completely all such light is extinguished by this mode of proceeding. Had any of the measures been employed singly, or if they had, every one of them, been used in succession, with certain intervals between each, the case might have been somewhat different; but, to employ them all at once, renders any investigation of their separate influence not only difficult, but impossible. You will not conclude, from what

has just been observed, that I am at present recommending anything with regard to actual treatment in the particular case in question. I am only desirous of illustrating what I mean to convey with *relation* to the mode in which any investigation should be conducted. To illustrate what I mean, still further, I will put another case or two. Suppose that I had bled a man largely for some affection of the lung, and he had got well,—it is quite conceivable that I might still be ignorant of the mode in which the bleeding had acted; but I should reason much more safely in regard to it, than if I had employed sudorifics and purges at the same time. Suppose further, that I had observed that, on the loss of blood taking place, his skin, which had before been dry, became endued with a copious perspiration; that his pulse became soft, and that his bowels had acted freely. Suppose further, that I had observed that his complaint subsided in proportion as a profuse perspiration came on; or, in another case, on the occurrence of free evacuations from the bowels. Suppose further, that this had suggested, as it naturally might, in another case, the attempt to produce profuse action before I abstracted blood; and, in another, the previous efficient evacuation of the bowels; and that, in both, the subsidence of the symptoms rendered bleeding or any other different measure unnecessary: and supposing that other circumstances having led me to the conclusion that, whilst many affections of the lungs require the abstraction of blood, yet, that the unnecessary abstraction of blood was injurious to the animal œconomy; I should at least, quoad two cases, have got some useful information; and, perhaps, not only as regarded the treatment, but also the causes of the malady: and all this, not directly, indeed, but from a process of reasoning of the easiest kind, founded on the simple circumstance of having bled under provisions which enabled me to observe the operations on the œconomy, consequent on the loss of blood; at least, with this approximation to correctness, that they were unobscured by the simultaneous impression of other agencies.

Again, I will put a different case. Suppose I have to treat a patient with erysipelas of the head and face, we will say of seven day's duration, accompanied by pain in the head, feeble pulse, and white and dry tongue. Suppose further, that I bleed the patient by cupping him at the back of the neck, prescribe a dose of calomel and jalap, and give him a saline draught with antimony every four hours, order his head to be shaved, and cold and damp cloths

to be applied to it. In the evening, which we shall suppose to be the third day of the month, the pain continuing, I apply thirty-six leeches. The next day I am informed that the patient is better, but I am *not* informed what the calomel, jalap, and antimony have done: the patient continues to improve, however, until the fifth, when, the head being uneasy, I apply twelve leeches to it; the next day, however, I find "a serious relapse of inflammation:" the head in pain, tongue white and dry, and skin hot. I now take seven ounces of blood from the arm, freely purge the patient, and order him to continue his saline and antimonial medicines. The next day I find that the erysipelas of the head has disappeared; but that the right leg, on which there had been an ulcer, is now hot and painful. I now apply eighteen leeches to the leg, and a bread poultice; and, three days after this, I find the inflammation gone, and that the patient may be considered well, Now, if I ask myself, what was it relieved the patient? I really cannot tell: it seems that he obtained no permanent relief from the erysipelas of the head until he was "freely purged," and this was simultaneously with the abstraction of blood (a very small quantity to be sure, seven ounces), which had been abstracted before without any material advantage, and, indeed, without any, so far as we can see, as regarded the erysipelas. Can I venture then to say, that the bleeding was of no use? No, I cannot do that safely; for when the inflammation came on the leg, its relief appears to have followed on the application of leeches; combined, however, with other measures. Again, it may be enquired, might not the antimony, calomel, and jalap, with the saline medicines, since they were in continued operation, have been the really curative agents? I cannot say that they were, because there were other remedies employed at the same time: I cannot say that they were not, because I have, in my own experience, often enough seen them successful without any other measures. In fact, I can arrive legitimately at no conclusion; and therefore, through difficulties chiefly arising from the treatment, and not from the disease, I must content myself with a selection from certain probabilities; preferring, for choice, that which refers the essential measure, however achieved, to the efficient discharges of the alvine secretions: I can in no way ascribe the cure to the venæsection; yet the case is headed as one so to be considered. When, in a subsequent volume, I speak of different diseases, I shall shew you, by examples, how every department of medicine and surgery is poisoned, as it were, by this

mode of proceeding; and how often all attempt at correct reasoning is destroyed by the simultaneous employment of various agents*, of such a character, and under such circumstances, that we cannot say that any one, or all the sequences, or their effects, might not have resulted from either one of them. It is, in reference to our hopes of improvements, consolatory to perceive, that these remarks refer to diseases of which our ignorance is the most profound. You must not imagine that either of the cases which I have put are really hypotheses; they are occurring every day; and if you wish to see types, or even examples, of them, I should refer you to the first list of cases which may fall in your way; medical, for choice: but either medical or surgical will probably equally furnish you with the illustrations you seek.

It must be confessed, indeed, that diseases oblige us very often to be content with the application of whatever knowledge with which we may be already provided; so that it is very rarely, in an acute disease, that we can commence an enquiry which has for its object the extension of our knowledge; unless, indeed, where an accidental circumstance, such as the refusal of a patient to submit to any particular measure, or some other circumstance preventing its adoption, furnishes us with an opportunity. This, however, is not very unfrequent, and the opportunity it offers should always be made the subject of our profound attention. In Dispensary practice, the irregular attendance of patients often perplexes us extremely in the management, and still more in conducting the reasoning, of cases; yet the same circumstance often develops very interesting results. For example,—sometimes a patient has presented himself with inflammation of the eye, with the organ in the following condition,—there has been present considerable inflammation; the cornea (the transparent membrane in front) has already become perforated by an ulcer; the anterior chamber (the little space between the cornea and iris) thus opened, the aqueous humour has escaped; and the iris (the membrane to which we refer the colour of the eye) is protruding through the aperture. Now, it is a common practice to touch this with caustic; although I am happy to see that Mr. Lawrence, in his Treatise on the Eye, is of opinion that it is unnecessary. It is many years since I relinquished this

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* Now all this is opposed to inductive reasoning: nor does this express the whole truth; in point of fact, it prevents our even laying the necessary basis of it.

practice; and I was first induced to do so, from the result of cases such as I have alluded to. A patient having presented himself, under the circumstances which I mentioned, finding himself relieved from the inflammation, relinquishes his attendance, and does not come again for perhaps two or three weeks; when it is found that the protrusion of the iris is much diminished, and in all respects doing, not only as well, but much better, than when treated in what was at that time the usual mode, and which still continues to be the practice of many surgeons; Mr. Lawrence, no doubt, aware of this, has cited Demours' authority, as supporting the better practice. In fact, as will hereafter be explained to you, the business of the surgeon is to subdue the inflammation; the prolapsed iris is managed entirely by Nature. Our knowledge of the nature and treatment of inflammation itself, may be improved by the due cultivation of accidental opportunity, in the same manner. Very recently, a woman applied at the dispensary, with a very threatening inflammation of the eye, chiefly affecting the sclerotica and iris; her catamenia were deficient, and there was much pain in the head. All this seemed to point very decidedly, according to received notions, to the abstraction of blood; but as the woman's general powers appeared to be, from some cause or other, much enfeebled, I did not venture on blood-letting, farther than by recommending its local employment by cupping or leeches. She, however, refused to submit to either: I therefore embraced the opportunity of treating her, with a reference to what might be supposed to be the causes (I mean the remote causes) of the inflammation, and the inflammation was successfully subdued without any of the means usually employed in such a case, except the application of belladonna, to prevent, as far as keeping it in a constant state of dilatation could do, the occlusion and adhesion of the pupil (the hole or window through which light is admitted to the eye) by coagulable lymph. You are not to suppose that the value of the information elicited from this case, or others of a similar nature, is confined to the successful treatment of each particular case; on the contrary, such cases unfold new views with regard to the real causes of inflammation, in a manner hereafter to be explained to you.

But to return. If our enquiries, however closely conducted, fail of absolute demonstration, it is the more necessary that we should be close in our reasonings as to probability. Let me here again refer you to cases.

Some years ago (being already convinced that rheumatism, although often excited by cold, still usually involved a deranged state of the chylopoietic viscera*) I met with a very severe case of acute rheumatism, in which I had tried all varieties of treatment, dietetic and medical. In about three months, however, the patient recovered; but he appeared to recover just in proportion to the rectification of the biliary function. This led me to investigate the subject of the connection of rheumatism with disordered biliary secretion; and, in the first twelve cases that occurred to me, the liver seemed to be the primary offender, and the rheumatism retired on the restoration of its functions. But what was the conclusion? Simply that disorder of the liver appeared to have caused rheumatism in the cases in question, and, by consequence, was to be regarded as one competent cause of rheumatism. The conclusion could not be safely extended beyond this. It was probable indeed, that, if the liver could thus affect the system, any disorder of the chylopoietic†, or indeed of any of the other viscera, might, in a person so disposed, produce the phenomena of rheumatism; but the grounds on which this probability itself rested forbade the conclusion that rheumatism was invariably connected with biliary derangement, although, perhaps, the occurrence of twelve cases in succession might be considered as at least tempting one to that conclusion. The fact however was, that, on continuing my enquiry, I found that, in many cases of rheumatism, I could in no way discover that the liver was at all affected, though in every case there was

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* The necessity of a more philosophical enquiry into the remote causes of inflammation will be spoken of in connection with that subject; and I hope to shew that it promises to be as prolific as the enquiry into the proximate causes has proved barren. It is of less consequence to ascertain what is the particular condition of the vessels in an inflamed part than to know why that condition becomes otherwise than natural. Hitherto we are content to know that the vessels carry more blood, and diminish therefore its quantity; but, after all, this is only attending to effects; the real cause is that which produces the disturbance as a whole, not that which gives rise to particular symptoms. Did we know this, we should as readily understand why our most active treatment is often unsuccessful, as we do why, when successful as regards the inflammation, it occasionally produces such a train of untoward symptoms.

† This term includes all organs engaged, either directly or indirectly, in the digestion of our food; viz. the stomach, bowels, liver, and pancreas, the "sweetbread" of animals.

sufficient evidence of derangement in some other organ. Now, here again the results are important; and, instead of rendering it more difficult, they lead us materially to simplify the explanation of the occurrence of rheumatism, in teaching us to regard it as an effect which, though it may result from disorder of a variety of individual parts, yet resolves its causation into anything which can disturb the animal economy. Thus, instead of being disgusted at the unsuccessful adoption of some principle which we had hitherto found to succeed, we immediately have our eyes opened to the explanation of our failure; we are taught to look at the whole of the animal functions, and to direct our treatment to those which seem powerfully or primarily affected.

I had intended, in this first discourse, to enter at large into the conduct of our reasoning in medical enquiries; to test it by the principles of inductive reasoning; and to shew where we can and where we cannot carry out those principles; but I found that, to make myself clear, and to do the subject justice, would require a volume devoted to it, and that I should be obliged to suppose you to be in possession of many facts, the development of which will be necessarily the object of future discourses; although I hope to occasionally interweave much more of the principles of inductive reasoning than I can do in the present discourse. My observations must therefore be very general.

In testing our conclusions, and the relations they bear to the fact, a very useful plan consists in the simple enquiry whether the facts ever occur without the consequence which our conclusions attribute to them, or the phenomena, comprised in such consequences, without the facts. For example: suppose a man is affected by fever who has been associating with or attending on a patient affected by a complaint exactly similar; and suppose this happens, in fifty instances, in the same village; the conclusion, the accuracy of which I propose to test by this method, is as follows: I suppose that the patient caught the fever from the man on whom he was attending: the facts, then, are—that he was attending on a patient affected by the fever, and that he was subsequently attacked by the same symptoms: the conclusion supposed is that he caught the fever as a *necessary* consequence of the attendance in question. I now, then, enquire whether there are any instances in which a man became affected with fever, without such attendance on a person previously affected with fever; and again whether there be any examples of persons who have so attended a patient

affected with disease, and have yet not been at all affected; and if I find examples of both—that is to say, of persons who have been thus exposed not being at all affected—and, on the contrary, of persons who have been affected without being so exposed, it is evident that my facts do not bear to the conclusion the relation of cause and effect which I had supposed. There is either no connection between them, or there is some link wanting in the one case which has been supplied in the other. This seems, I admit, very simple; but I beg you to bear it in mind: it is a fact of the very first importance in conducting our investigations; and, in the investigation of rheumatism to which I have alluded, it is essential in enquiring whether it may not arise from affection of particular organs; to enquire also whether the organs in question may not be affected without the occurrence of rheumatism; for, if we find that to be the case, the rheumatism may still truly enough occur, in certain cases, in connection with disease of that organ, but still not as a direct or necessary consequence, but through the intermediate or previous influence of other causes, such as individual peculiarities, &c.; shewing us, in fact, that our conclusion is imperfect, not as having *no relation* to the fact whence we deduce it, but as being without its *true and precise relation*, in consequence of our not knowing the bearing of other facts on it of which we are ignorant.

I will adduce one more example. Inflammation we will suppose to consist in the simultaneous occurrence of increased redness, heat, swelling, and pain; and I wish to apply this mode of reasoning to ascertain the essential relations of these appearances to inflammation. I begin by redness. Well, I find it in blushing, in the ruddy arms of those exposed to cold, in the reaction which this cold induces; but there is no inflammation in either of these cases. But again I find inflammation of the transparent front of the eye (cornea), and sometimes also of the iris, without any redness. So here is inflammation without redness, and redness without inflammation. I institute the same enquiry as to heat: I find that the heat of the surface is often very much increased beyond its natural standard, both in health and disease, and yet without any inflammation. I find also that, in inflammations, in which I cannot distinguish between the ultimate effects, all kinds of heat are observable; excepting only that it never rises much, if at all, above the heat of the interior of the animal; whilst, where the products of inflammation take much time for their formation (chronic inflam-

mation), I often can discover no increase of temperature at all. Then, if I consider the law of inflammation, I find inflammation without pain, and pain even to torment without inflammation. If I consider swelling, I have more difficulty. I cannot always perceive swelling in parts inflamed, it is true, as in the iris and cornea, fasciæ, etc.; but many reasons induce me to pause in concluding it is not there; because a very considerable increase of bulk in such parts might escape my observation; whilst, in almost every instance of swelling, I recognize phenomena very much allied in one way or other to inflammation. I here pause, inclining only to the conclusion, that increase of bulk is hitherto the most essential attribute of inflammation to which this investigation has conducted me. For the tenderness, I find it frequent without inflammation; and occasionally inflammation of the most dangerous character without tenderness. On the contrary, inflammation may occur with tenderness as its only external symptom; as I recollect in a boy who had inflammation of the fascia of the thigh, extending to the veins; which suggests another lesson to you, viz. that a symptom may have very little relation to the real cause of the malady. The obscurity which I have mentioned, as arising from the simultaneous employment of several measures, is abundantly exemplified in the number of articles usually included in our prescriptions*. The Pharmacopœia issued by the London College seems to me to be by no means exempt from this objection; but it applies with still greater force to extemporaneous prescription. A variety of articles are combined, some of them having similar properties; others very different ones; and some again having perhaps very little power at all, the administration of the whole being followed, in many cases, both by success and failure. This will be more particularly exemplified at a more convenient time; but I may here recommend you

* It cannot be doubted that, philosophically speaking, the total disregard of an inductive reasoning in prescription, tends greatly to impede the progress of science. Scarcely a year passes without some new fashionable medicine; nor any three without some one of them going into disuse. Thus, when a new medicine is found, it is tried, in a spirit of pure empiricism, in a vast variety of dissimilar instances, without, as far as I can perceive, any of those attentions which the most common sense suggests as indispensable to any approximation to sound reasoning. Then again, medicines which have been rejected become, like obsolete styles in costume, again in vogue; so that science becomes merged in a pervading empiricism. The histories of prussic acid, strychnine, arsenic, quinine, creosote, iodine, and even mercury, present, severally, illustrations of one or other of these observations.

generally to adopt simplicity in your prescriptions, if you wish to obtain any real knowledge as to the effects of remedies or the peculiarities of individuals. If your object be to solicit the function of any organ, no matter whether by purgatives, sudorifics, diuretics, tonics, or probilious medicines, let your plan be as simple as possible; and, if you do combine remedies, adhere as closely as you can to those with the uncombined properties of which you are best acquainted, and which either combine mechanically only when mixed, or with the chemical combination of which you are well acquainted. A rational adoption of such a rule will give you ample latitude of prescription, without encumbering your reasoning with unnecessary difficulty. I do not mean to say that you will never be obliged to depart from such a rule. I do not assert that you will never be obliged to employ, in *the present state of our knowledge*, some remedies on grounds purely empirical; but I do say that the occasions will be comparatively rare, and that every year will, in all probability, render those occasions still less frequent; and that a sedulous study of what is really practicable, in regard to a scientific mode of prescription, will, without involving any risk to your patient, not only enlarge your knowledge of remedies, but facilitate your enquiries into the causation of disease; and that a recourse to mere empiricism, if you observe and practise the other principles which I shall endeavour to explain, will be so seldom requisite as to become a very unfrequent exception to a general rule.

In reasoning on probability, of course we include analogy; for, in fact, if we examine the principle of probability, we shall find that it rests chiefly on the application of analogy, either real or supposed. Now, wherever we cannot arrive at demonstration, reasoning from analogy is of great service; but then the analogy should, of course, be real. Notwithstanding that probability might possibly, by a refined analysis, be shewn to rest on analogy, yet, in practice, there is thus much of distinction between them: that, whilst analogy always implies probability, probability does not always imply analogy, in the common acceptation of the term. I say then that the analogy should be real; in plain language, that the resemblance on which we reason should be a real likeness. For example, I may mention the following. Suppose I wanted to ascertain any point with regard to the circulation of the blood in man, and that, inasmuch as the enquiry involved the death of the animal, I were obliged to conduct it by observation of some other creature;

what creature should I select? If I am content with a general analogy, any *animal* would answer the purpose, because there are certain analogies between all. All animals have more or less powers of motion; all animals have a power of assimilating certain extraneous matter to the nature of their bodies; all animals have a circulation of some kind or other: but then they differ in many particulars. Their powers of motion vary in a very considerable degree; so do their powers of assimilation; and, what is more to the purpose, so do their powers of respiration and *circulation*. Some animals cannot live in air; some cannot live in water; some can live in both. Then, as to the circulation: this is conducted in many very different modes. Some animals have their circulation performed precisely in the same manner as man; others, in a mode which we can prove would be, in man, instantly fatal. You now see, that, supposing you were to take a dog and a frog, you would take an animal in both instances—a being with digestive, respiratory, and circulating systems in either case; but still the resemblance between them would be extremely imperfect. A frog, for example, circulates a blood, more than one half of which is venous, a condition under which a man could not exist for two minutes. The temperature of his body is not half that of the human subject; and, whilst the human body has the power of preserving an uniform temperature under great varieties of heat and cold, the power of the frog in this respect is exceedingly limited; all of which relation to temperature is intimately connected with the circulation; as we infer from the fact, that, wherever we find the circulation carried on as in the frog, we find the other properties which I have mentioned. We find, it is true, that both man and the frog possess powers of motion; but nothing can be more different than the manner in which life acts in the two creatures. Habitually, a slow, sluggish kind of being, the frog moves but a short distance from the place where he was born; but yet, when he does move, he has powers of motion to which there is no parallel in man, their proportions being considered. Now, in a dog, all these matters are not only much more alike, but the conduct of the circulation is absolutely the same with that of man. I have been thus particular in the illustration which I have adduced, because, strange as it may appear to you, it is nevertheless true, that many of the reasonings with regard to the minute circulation in man have been founded on the observation of frogs, with the additional sources of obscurity which result from the nervous sys-

tem, whence all actions are derived, having been placed under the torture of experiment; and from those optical illusions which, in such cases, are never certainly separable from microscopic observation.

I will here introduce the few remarks I have to offer on investigations involving the dissection of animals which are yet living. I must confess, that, instead of having afforded any abundant addition to our useful knowledge, experiments on living animals appear to me to constitute a field the most barren in its products of any with which I am acquainted. But, I do not include those investigations which merely involve the death of the animal under circumstances favorable to examination of particular points: as a short time after eating; in killing it in a particular manner, as by division of the spinal marrow, or by bleeding. How many animals, while yet alive, have had their spleens taken out? and with what result? That there is scarcely any organ in the body concerning which we are so thoroughly ignorant. To what have the more or less cruel, and so often disgusting experiments of Spallanzani led us? Are we at all indebted to him for any increase of information? The experiments of Spallanzani on generation, though they may have produced results which might not *a priori* have been expected, have in no way whatever, that I see, added one particle to our *useful* knowledge. His investigations into the nature of digestion are perhaps interesting as matters of natural history, and as furnishing tangible illustrations of the adaptations of animals to the habits which they are destined to observe. But in what way have they really increased our perception of the intrinsic nature of digestion? or, what is more to the purpose, what useful bearing have they exerted on the progress of medical science? For my part, I do not perceive that they have shewn any thing *important*, but what might have been perceived every day by common observation, without any experiment at all. I would also here impress the difference between the gratification of curiosity, and the cultivation of science. Upon no one subject, perhaps, have more experiments been performed on living animals than in regard to inflammation, all chiefly with a view to the ascertainment of its immediate (technically called proximate) cause: but here, again, we are rather more ignorant than we are on almost any other point. I cannot put this argument more honestly than by referring to Mr. Hunter's experiments; because there is no one for whose mind I have a higher regard, nor any one the weight of whose authority would be more likely to influence my opinion. Yet

I think that Mr. Hunter's experiments on living animals only do one of two things; they are either actually inconclusive, or, if they elicit any thing, it is only what is much better established by some other fact; and, in general, by some other fact which Mr. Hunter himself furnishes. Now, to the facts established by bleeding a horse to death, I take no objection; neither do I see any cruelty in an experiment which is necessary every day—I mean the killing of horses. When the horse was dead, Mr. Hunter took out portions of artery from different parts of the body; and, slitting up these different-sized vessels, which were, of course, in a contracted state, he measured them. He now wished to know how much of their contraction depended on their elasticity (since an elastic tube would necessarily contract as far as its sphere of elasticity allowed it, when no longer kept open, as it were, by the fluid which was wont to flow through it), and how much on their muscular or vital power; since muscular contraction is a property of animal life, and elasticity exists independently of it. Having then measured the vessels as I have stated, he stretched them as far as their elasticity would allow, and took the measurement of their extension. He now allowed them to contract, and measured them again; and the difference between this last, the contraction of elasticity, and the first, when the vessels were removed immediately after death, he considered the degree of contraction depending on their vital or muscular power. We shall have to talk of this experiment again: it certainly appears very simple and beautiful, and, for the general purpose of establishing contractile power, tolerably conclusive. The next experiment of Mr. Hunter which I shall consider—for I take what appears to me to be the best, and one which involves perhaps as little cruelty as any that we know of—was made on a living animal. He produced inflammation in a rabbit's ear by freezing it; and, when the inflammation was established (he had, to be sure, other views in the experiment, but I take the more important evidence at present), he killed the animal. On injecting the ears, he found that the vessels of the inflamed one were much enlarged, many arteries appearing injected in the inflamed, which did not so appear in the uninflamed, ear; whilst those which did carry the injection in both were much larger in the ear in which inflammation had been induced.

Now I have not *really* any objection to offer to this experiment; but I do assert that it is not more conclusive of the fact of the vessels becoming larger in an inflamed part than many other facts

which we may observe in our daily practice. Do we not see the vessels enlarge under our eyes in ophthalmia? Do we not see vessels now carrying red blood which ordinarily carry colourless fluids? Do we not feel the artery going to a whitlow beating with more violence than the one in the opposite finger? Do we not see the veins enlarged returning from an inflamed part? or do we not feel pulsations in arteries which did not affect our sensations before? and do we not see the part vividly red, there being no fluid in the body of that colour but the blood? If there be anything in the medical sciences like demonstration, surely this is it. There is no possible objection to it; whilst, if we were to refine a little, the case of the rabbit's ear might be different. The vessels might, by death during inflammation, have been deprived of that contractile power*, which muscular parts exhibit after death, and of which they are, under certain circumstances, actually deprived; and thus the same force of an injecting syringe, which in a sound ear would only produce the ordinary dilatation of arteries, might easily, in vessels so altered, produce a greater distension. I do not mean to say that I entertain this opinion; but no one can say that it is impossible; whilst there is no objection of this kind attached to the phenomena which I have instanced as observable in the ordinary development of inflammation in the human subject.

Sir Charles Bell's experiments, by which he showed that the anterior branches of the medulla spinalis were nerves of motion, whilst the posterior ones were nerves of sensation, have, in my opinion, been regarded with more importance than they deserve; although, far from wishing, in any way, to depreciate the labours of this accomplished surgeon, few persons can entertain a more real respect for them; and, indeed, were my purpose to carry an argument, rather than to advocate the true interests of science, so interesting do I think the experiments in question, that they are the very last that I would have cited; but, if my object be really truth, if it be really to shew that we are, independently of other grave objections, misemploying time when we experiment on living animals, I ought, in honesty, to select those results which appear to me most to favour a continuance of the practice.

On closer examination, the interest of these experiments results from our having been too much disposed to conclude that

* Müller, in his recent work on Physiology, seems opposed to the opinion that arteries are muscular. Of his arguments I am quite satisfied that the reader should judge for himself. See first volume, Müll. Phys.

motion and sensation were derived from the same nerves, not only without any just grounds, but contrary to a very obvious analogy (an example of one kind of obstacle to science mentioned by Lord Bacon—Idola Theatri?). We see certain nerves giving us smell, others sight, others hearing, others taste, and so on; and we know that we cannot hear by the olfactory, or smell by the auditory nerve, though these be all connected with the brain; and in the brain, though apparently a single organ, we see mysteriously connected, not only numerous, but even opposite, functions, as intellectual powers, and animal propensities. What right have we to conclude that sensation and muscular action were performed by the same nerve, any more than sight or hearing? Surely nothing in nature can be more different than is the action of lifting my arm from feeling it warm or cold. The two things are, in fact, so different, that, in common language, *one* may be said to convey no sensation at all, whilst the other is nothing but sensation. But, more than this, we knew that sensation of a part was sometimes lost, whilst motion remained, and *vice versâ*—which, with the argument from analogy, was a demonstration that the communications of the two powers were distinct, even though they had been conveyed through nerves whose origins were apparently single. Here, then, is another example of how little we avail ourselves of the observation of obvious phenomena, of which the very interest we feel in Sir Charles Bell's experiments is itself an illustration*. But in what way has our power of relieving disease been increased by the fact, that there are, going off from the spine, certain nerves of motion and certain nerves of sensation? To shew, on the contrary, what may be done by observation of phenomena, in regard to establishing certain distinct functions in different parts, not merely detached from the same organ, but forming integral portions of one structure, it is impossible not to regard what has been done by Gall and Spurzheim with considerable interest. Indeed the history of no science has evinced more powerfully how much may be done by

* Dr. Spurzheim observes that "It was, long ago, remarked that feeling and voluntary motion were not always impaired or annihilated simultaneously; sometimes the one, sometimes the other, of these functions, was seen to be totally lost, whilst the other remained unimpaired. The conclusion then followed, and it had already been seized by Erasistratus of Alexandria, that there were nerves of motion and nerves of feeling. Pathological facts, therefore, first fixed the attention of physicians on this point, as they also gave the first idea of a decussation of nervous fibres in the brain, and of the peculiar structure of the convolutions."—

SPURZHEIM, *Anat. of the Brain*, sec. iii, p. 37.

the observation of phenomena than Phrenology; and I am very happy to have so good and so simple-minded an authority as was Dr. Spurzheim, to support my opinion as to the inconclusiveness of all experiments on living animals. Phrenology is altogether a modern discovery, and a science which seems to stand its ground, to say the least of it, amidst a great deal of opposition, prejudice, and that very trying test, ridicule.

I do not wish to be understood as advocating the whole for which the phrenologist contends; still less do I wish to oppose it. I know too little of the science to render my support of it worth having; and, were I so disposed, common sense would prevent me from contesting the truth of doctrines, for the due examination of which I have not had either leisure or opportunity; but it is difficult for any one who contemplates human knowledge in the circle which it forms, and still more to consider the phenomena of human nature, without feeling that, whatever errors there may or may not be in the details of phrenology, it is, nevertheless, a science founded on truth. It is impossible not to perceive how harmonious the fundamental principles of phrenology are with all the facts which we derive from other sources, whether anatomy, physiology, or the more enlarged field afforded by the general observation of mankind.

We all believe that the brain, as a whole, is the organ in which our feelings, propensities, and intellect are seated. The phrenologist only contends that different functions are allotted to different parts of it. This is exactly what the nervous system shews: nine pair of nerves go off to different organs from the basis of the brain; yet can anything be more diversified than are their several functions? Then, again, if we examine why we admire the intuitive perception of the το πρεπον in the Greeks, in the sculptured heads which are still extant; and if we enquire why they put a different head on a philosopher and a gladiator, we shall find a practical phrenology,—we shall find that a certain district of the philosopher's head is more developed than that of the gladiator, and that this part has a correct general accordance with that part of the brain to which the phrenologists would refer their distinguishing peculiarities.

The phrenologist asserts, that the power of any organ is increased by exercise, and probably its development also. That intellectual, moral, and animal powers increase on cultivation, we know; we see it in the exercise of intellect, in the cultivation of moral principles, and in the abandonment which accompanies the indulgence of the passions: and we see that the increase of mus-

cular power, consequent on exercise, is generally attended with development of the structure with which the power is connected. Thus, muscles increase on exertion, and whenever we find a particular sense in an animal highly developed, we have in proportion a large development of the nervous structure. We know that, as is the bulk of the muscle, so is its power; but then, not absolutely without exception; since, sometimes a man with comparatively small muscles, will be stronger than another man whose muscles are larger: and you occasionally see a great muscular fellow, who is nevertheless far less powerful than you would imagine. The activity of life is different in the two cases. Temperament has considerable influence too; so says the phrenologist with regard to the brain.

The phrenologist further asserts, that developments of particular districts of the brain will be ascertained by corresponding developments of the cranium: this position, however, important as it is, is nothing more than a necessary consequence of the primary propositions, if they be true; since the very function of the cranium renders it impossible that it should be otherwise; masses of bone, the result of accident or disease, of course excepted. Further, they tell us that all people have all the organs: it would be difficult to conceive how we could be responsible beings, were any of us deprived of the powers which guide our conduct: but they also say that various and even contradictory propensities are often powerfully developed in the same individual; that, cæteris paribus, the actions will be according to the preponderance of the organ; and that, when they are equally balanced, the conduct will exhibit reciprocal modifications. That is, as if a high development of combativeness and caution, for example, were to produce prudent activity. Now all this is just what we see, I think, in mankind. Lastly, the phrenologists challenge examination of the crania of men and animals: and a very interesting fact is, that the observation of certain manifestations of mind, in connection with certain distinctions in form, preceded all theory on the subject. These facts, few as they are, seem to me to preclude any one from giving an opinion on phrenology without a dispassionate examination of it. I have myself seen a phrenologist often give a very good general digest of a man's character, whom he had never before seen. Now, that phrenology may often fail, in what I may call its craniological application, is no argument against the interest which attaches to those examples of its suc-

cess. It may shew that craniology, or even phrenology, is imperfect; but it does not prove that its principles are untrue: in fact, there is no getting over any one well-marked example of its successful application. There seems in it enough of truth, not only to purchase immunity from ridicule, but to invite the investigation of the philosopher. How should *we* fare in *medical* science, if every principle *we* consider sound, were disputed because its application was never *invariably* successful?

But, to return to experiments on animals, I say that when they involve torture, they must be inconclusive; since the functions, through which the vital properties of parts are manifested, are disturbed from their natural condition; and I should just as much think of deducing conclusions from phenomena exhibited when an animal is under torture, as I should of estimating the powers of the stomach by reference to a patient labouring under indigestion.

If a common headache or toothache will disturb the whole animal œconomy, what may we not expect from the writhing of an animal under the torture of experiment? Is it not flying in the face, as it were, of that common sense which is the very essence of an inductive philosophy?

To waste time, therefore, is bad; but to misspend it in pursuits which have the additional objection of being questionable, in a moral sense, is still worse. I rest my objections to them, however, on scientific grounds; but I am not ashamed to confess, that I think there is something revolting in experiments on living animals; and that I can by no means consider them innocent. And I am not sure, that even did I know that I could only improve the treatment of diseases by experiments on animals, whether I would perform them. To advance science in that way has, even when looked at in the most favourable view, all the objections of an undisguised selfishness; and as it is infinitely more important *how well* we live, than how *long* we live, the former consideration may well outweigh the latter. I have no mawkish sensibility on these points: I have made experiments on living animals myself: they have not been numerous, certainly; but I mention it to shew that I have not been more immaculate than my neighbours; but, subsequently, reflection on that subject has presented me with the conviction, that they are as scientifically unprofitable as they are morally improper. Their object is, generally, to discover by the eye, what may be safely enough arrived at by better and higher modes of observation. We are very apt to trust too much to our external

senses, and especially to the eye: now the progress of science has been materially retarded by this circumstance; for the laws of Nature are things of a kind which require our intellectual, and cannot be trusted to our visual, perception.

I am not aware of any moral argument which can be urged, in favour of experiments on living animals which involve any suffering beyond that necessary to destroy life, which has not this capital objection in limine; viz. that it assumes the question settled, which would determine our right to torture them under under any circumstances: which question, I apprehend, it would not be difficult to settle in a manner directly opposed to such assumption. But supposing, for a moment, that there were some circumstances under which this torture were justifiable; which, I repeat, is not the case: what are we to say concerning the hundreds of cruel experiments which have been performed, without the slightest advantage?—which shew only, in fact, that numerous animals, for whom a variety of benevolent provisions have been made by their Creator, have been tortured by man without the smallest advantage; and which, were this the place, might be easily shewn to be constructively injurious; for there is no such negative condition as that implied in the term, "without advantage." Surely, as Paley would argue, such experiments, however we deduce them, must have been contrary to the will of God; because they have, in no sense, contributed to, but opposed, the happiness of his creatures. In plain words, therefore, they must have been immoral. Even could it be made to appear, that experiments on living animals ministered to our temporal advantages, these could not, by any latitude of concession, be allowed as a ground for their justification; for, if they be morally wrong, the supposition that they are really advantageous, involves a contradiction; since, if we are to believe anything, we must believe that that which is really moral, must be really advantageous. I am aware that scruples on these points are so little thought of or respected, that they are even made the subject of joke and ridicule; and this, too, on occasions when men have met to forward the interests of science. At a learned society, I heard one gentleman declare that he saw no other way of enquiring into the vital processes: but I neither admired his science nor his humanity. If we regard experiments on animals in their scientific, as contradistinguished from their moral, application, our object is not merely to view them with reference to what may have been anatomically or physiologically the proxi-

mate object of their enquiry, but in relation to their remoter, their pathological application; whether, in fact, they have shewn us how to prolong life or cure diseases. I confess myself unable to discern that they have done either the one or the other. If, then, a mode of enquiry be in principle immoral, and scientifically unproductive, the two facts reciprocally enforce each other. No one denies that we have faculties adapted to the interpretation of the laws of Nature; and no one disputes that it is our duty to employ them. This latter necessarily implies a free agency, so that we may use or abuse such faculties. Now, it would be equally unphilosophical and irreligious to suppose that their abuse would be more productive than their use; or, in other words, that the immoral conduct of our faculties would be most productive of useful knowledge; for the question is not, whether any ingenious or refined cruelty to animals can tell us what we did not know before; but whether it will help us to interpret the laws of Nature: nor is this the whole question; for the condition must be added,—whether it tells us anything, even though it should help us to such interpretation, of which we have not sufficient evidence (if we will enquire after it) without such cruelty? The whole argument may be put thus:—that what is morally wrong, will prove scientifically unproductive; and, for my part, I see nothing in the whole history of experiments on living animals to contradict this position. But if this be a tenable position, how forcible the argument becomes when we regard the time thus lost which might have been usefully employed. We see indeed how "a cripple in the right way may beat a racer in the wrong." But the whole of this subject is so opposed to prevailing prejudices and customs, that nothing short of a work devoted to it (in which an inductive digest of all the experiments which have been made, and their real bearings exposed, should be included) can be regarded as likely to disencumber medical science of erroneous notions, arising from the source I am considering.

In considering the undue reliance which has been placed on our external senses in scientific investigations, we may select sight; not because the objections in regard to it are more true, but because they are, in practice, more powerful, as having a more direct relation to the subject. We are accustomed to believe that we receive more information and pleasure from the eye than from any other sense, singly considered; and this, perhaps, it is which disposes us to place a reliance on it, to which it demonstrably holds no just claim. In fact, the subjects it takes cognizance

of are, for the most part, more gross than those appreciable by any other sense; for light is to be regarded merely as the external condition necessary to the organ perceiving anything, as we know by darkness. We can smell, and hear, and taste, with much greater real precision than we can see. In health, we never taste bitter as sweet, or sweet as bitter; we never hear an acute sound as a grave one, or vice versâ; nor do we refer the odour of the rose or the violet to any substance exhaling one of a different or contrary character. The eye, however, is continually deceived: the mere position of the body will sometimes convey to it very erroneous sensations; whilst the laws of reflection and refraction produce such phenomena in certain bodies, as prevent the unassisted eye from ascertaining their true positions. Again, the microscope informs us of animals so minute in structure, that the naked eye can distinguish nothing, even when thousands of them are congregated together. We might have been warned of the fallibility of this sense, even in this factitious extension of its ordinary power. Galvanism, electricity, and most of the gases, are absolutely invisible. The eye, and the other organs of sense, inform us of the obvious qualities of things, and of those, probably, which are most connected with our necessities: but they never acquaint us with their essential characters, except through the medium of a distinct mental operation: thus we know a thing to be hard, soft, pointed, obtuse, rough, smooth, red, white, bitter, sweet, &c. but no more: a solid seems to us as if its particles were in contact, when we know that they cannot be so.

The scales of many snakes appear closely in contact, whilst the microscope immediately shews them to the eye to be as distinct as the particles of matter are shewn to be by the understanding: in short, if you compare the various illusions presented by the external senses, the optical are far more numerous than any other; yet it is unquestionably this sense, the abuse of which has done most harm to medical science. It is but a few years since, and I know not that the idea is every where absolutely abandoned even now, that we constantly heard that this or that part was not vascular, because we could not demonstrate it by forcing into the vessels coloured fluid; although perhaps the parts had exhibited powers of alteration and repair, just as we see in other parts of the body: but supposing that such absurd modes of reasoning exist no longer, it is much to be feared that a habit, of which it forms a part, still continues to vitiate our mode of en-

quiry. We find still, men, whose minds might be well employed in observing phenomena, directing their eye to the unravelling of intimate structure, notwithstanding that so little of really useful knowledge has been obtained, with regard to the laws of the animal œconomy, from any researches into the ultimate arrangement of structure.*

In surgery, we every day see examples of the mind being misled by the eye, and the consideration of the whole condition of the body sacrificed to the observance of some obtrusive character, or peculiar arrangement of one of its products; in the local disease, in fact, by which the disorder of the system may be manifested.

The whole history of cutaneous diseases supplies little more than a catalogue of illustrations to the preceding remark. When, on the contrary, the external senses are used with a more measured reliance on them, the case is very different; then they become, of course, highly serviceable, and are to be regarded as valuable assistants. They help us in the collection of facts; but they cannot be trusted in the deduction of conclusions; they act, in fact, as channels of communication from the external world—portals as it were to the mind, through which are brought, from various and dissimilar sources, materials for contemplation.

The Mind, having examined the material thus brought, and having, in some cases, tested the nature of that brought by some one sense, by the examination of some other, proceeds to reason on their relations, uses, and the laws by which they are governed.

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* Lord Bacon says, in the introduction to the Novum Organon, that one of its objects, in regard to the cultivation of science, "is generally to reject that work of the mind which is consequent to sense" (immediately, as it were), for he adds, "and to open and prepare a new and certain *way* for the mind *from* the immediate perception of the senses." Now, from the whole of what he says in regard to the senses, it is clear that we must understand this passage as if he had said, we distrust the senses in the communication of truth in the *interpretation* of Nature, excepting through the agency of the intellect; the part of the mind not being its mere and direct acceptation from the senses, but through a previous examination, conducted on certain rules which I am about to unfold, &c. Again, in Aphor. 50, he says, "for sense is a weak and erroneous thing," regarded of course as a substitute for mind. In connection, too, with the elaborate employment of the senses, in common with other modes equally unsuccessful in unfolding to us the laws of the animal œconomy, and the pervading absence of inductive philosophy, I make one more quotation from Bacon, which I think we should well consider: "It is a madness and a contradiction to expect that things which were never yet performed, should be effected except by means hitherto untried."—Aphor. 6

I have, however, been led into a long digression from the subject with which I commenced this section—I mean reasoning by analogy. I can only, however, in these preliminary lectures, expose certain principles, which will be more fully exemplified as we proceed; but, in regard to reasoning by analogy, I will here observe, that we too often reason in disease from analogies deduced from the phenomena of health. Now, in practice, nothing requires more caution than this; there is much of good in it; but, unguardedly applied, much of error also. I will take the very important subject of diet as an example. In health, nothing can be more true than that the natural food of man is a mixture of animal and vegetable food, and that wine and ardent spirits are unnecessary; but, if we were to carry this reasoning into practice (I speak not of acute diseases, for there it is not done), in the treatment of a vast variety of chronic forms of disease, we shall fail to relieve many, which a more considerate view of the matter will place within our power; and we shall aggravate others by our very endeavours to relieve them. We should recollect then that, for the most part, we have to deal with conditions of the system wherein we can seldom calculate on the vigorous performance of any one function; whilst, in health, the exact reverse is the case: in other words, the analogy is not real*; and hence that, for the most part, in establishing the diet of any case, we shall find it necessary to reduce the food even below what in health would be a moderate standard: further, we shall have to vary the kind of food in a corresponding manner; some doing better with a diet wholly vegetable, others with a diet chiefly animal, with the addition of dry farinaceous matter; and a third class of cases requiring things not only useless, but perhaps injurious, in states of sound health†. Now, no generalizations from the observation of healthy phenomena will apply directly in the adjustment of these particulars; they will conduct our considerations in some measure; but the knowledge of the detail must be the result of cautious experiment and observation. Mr. Abernethy appears to me to have restricted the beneficial operation of the beautiful principles which he so successfully unfolded to us, by sometimes reasoning on a false analogy; his generalizations are perhaps the best that we could

* The desideratum being the adaptation of the agenda to the power; whereas the rule too frequently adopted is an endeavour to raise the power to the agenda.

† Medicine itself may be regarded as an amplification of this principle.

have ; but they do not sufficiently embrace the exceptions which we meet with in practice. The application, therefore, of a plan of diet, excellent in principle, often proves inapplicable to the case, and (in hastily judging people) creates a general distrust of its importance. Now, I shall have ample opportunity of following out this and other modes of reasoning, more particularly when I can exemplify them ; and I shall conclude this discourse by a few remarks on the necessary qualifications of the medical practitioner. As these, for the most part, apply generally, I shall dismiss those which have been supposed to relate more particularly to surgeons in the first place. It is conceivable, indeed, that certain peculiarities of a physical kind might unfit a man for some of the duties of a surgeon, who might, nevertheless, become a distinguished physician ; since surgeons are more exposed to disgusting and painful impressions than those who are engaged only in the practice of medicine. Individuals, so organized, may advantageously restrict their attention to surgery, to its *study*, confining their *practice* to the ordinary duties of the physician. I see no objection to a division in practice*, except that it abridges a man's utility. The division of *study* is the thing which is really mischievous ; for, whether physician or surgeon, I agree with Celsus, " eum laudo qui quamplurimum percipit." He who selects this or that department in practice will seldom attach himself to that for which his nervous organization unfits him. In olden times, Celsus spoke of the " manus strenua stabilis nec unquam intremiscens ;" and undoubtedly coolness and self-possession are very essential ingredients in the qualifications of a surgeon ; and we see it occasionally, in every one, disturbed, when tested by unforeseen difficulties or complications. I have seen a great many operations, and have performed not a few myself, under circumstances of deficient light, attendance, &c. ; and I would not believe any man, who had much experience in this way, who said that his nerves had never been disturbed ; for if he were even devoid of feeling, a rare case I trust, still there are various other causes by which such a man may be disturbed, but to which men well constituted are not exposed. In

* A very sensible author (Thompson on Inflammation), in his introduction, says, " Division of labour may in this, as in other practical arts of life, be attended with advantages to society ; but, in *learning* and in *teaching* the elements of physic and surgery, it must never be forgotten that they are branches of the same art (have had the same origin ?), are governed by the same principles, and pursue the same object." P. 102.

fact, there is no greater mistake than that which supposes that absence of feeling will supply the place of self-possession. It is a very poor substitute. A man's mind will never work more favorably, either for the examination or relief of his patient, or for the plan and execution of an operation, than when it is influenced by a manly sympathy for his sufferings, and a single-hearted desire to remove them.

There never was a better or more successful operator than Cheselden, and he shews how practicable is the union of skill and steadiness with humanity. Notwithstanding that he was so skilful and successful, we have his own confession that no man felt more before he performed an operation than he did. I cannot myself perceive any just grounds for suffering, if a man conscientiously does his duty; but should a man, through his appetite for applause or fame, feel so unscrupulous as to the means of obtaining it, as to allow that consideration to take the lead of the abstract necessity of the operation, he will probably live long enough to discover that the best approbation is that of his own conscience. Never perform an operation, Mr. Abernethy used to say, on another person, which you would not under the same circumstances have performed on yourself. It is, as it appears to me, a most excellent application of the well-known precept; it is the best recipe I know of, whether the interests of the patient or surgeon are considered; no man's hand, if he has sufficient knowledge, will fail of enough of the "strenua" or "stabilis," if he make use of it; it was a favorite maxim with Mr. Abernethy, and that which has been said with much less truth of some other of his prescriptions may indeed be said of this; viz. that he employed it on all occasions. At present, erroneous notions prevail in regard to our operative department*; and, until the public are really informed as to the very humble claims of mere operative surgery, as compared to the higher departments of the science, they will continue to regard it as an efficient test of ability: but the day is fast going by; such notions are visibly on the decline. Operations, however, are in general so very simple, that even that attention is seldom paid by the mass to

* High authority has sometimes been quoted, in regard to operations, which would lead to the inference that the surgeon's duty was to study rather how he should remove parts than how he should prevent that necessity. I purposely avoid recording the expression, because nothing can be more mischievous than its dissemination, or more untrue than the proposition which it involves.

their study which they really require; and thus what is really due to an unpardonable negligence is attributed to the difficulty of the operation. Therefore, no surgeon should neglect the study of them; and the simplest mode is to perform all such as admit of imitation on the dead subject, and then dissect the parts and see exactly what has been done. This, a few times repeated, with the occasional witnessing of operations on the living, will very soon give the knowledge required; and, for its application, I again repeat, a sound knowledge of your profession, and the moral principle I have above mentioned, are necessary. So much for the surgeon: now, then, we will briefly consider the qualifications of the medical practitioner generally. I shall not describe any particular curriculum for your studies; how many lectures you should attend on this or that subject; nor how long you should loiter about the precincts, or run round the wards, of an hospital; nor the exact quantum of knowledge which you should possess on any given branch of science; for it is of no use to recommend plans of study which cannot be pursued in any two instances in the same manner; or rules, of which situation, pecuniary means, and various other causes, will unavoidably vary the observance. It is, therefore, expedient to mention such directions as are of general application. Regarding anatomy, physiology, and observation of disease, as your staple commodities, you should endeavour to strengthen your mind in its application to them, by as good a general knowledge of any other of the sciences as opportunity may place within your grasp, and endeavour to improve and direct your mode of observation, by bringing every thing to the bar of common sense, disciplined by a careful perusal of Lord Bacon. The nomenclature of our profession renders some knowledge of the classics necessary; and, when you are about it, you should not fail in getting as great a familiarity with them as you can. They are very useful, always ornamental, and often point out a man as worthy of confidence to men who employ no other means of forming an opinion. The knowledge also of any of the European languages, especially French, German, and Italian, will be a very useful addition to your acquirements; wherefore, should any opportunity offer itself of obtaining a knowledge of them, you should be prompt in availing yourselves of it. These, however convenient as accessories, are not the first considerations; and, indeed, a knowledge of living languages is by no means difficult, at any time, to any one who will make the experiment for himself.

In writing discourses which, though not addressed exclusively to, are intended to be perused by, young men entering the profession, a few words on general conduct seem to me not otherwise than proper. If we compare the general deportment of the profession, as a body, with any other class in the state, we shall perhaps feel no reason to be dissatisfied; but, on the other hand, it would be uncandid to conceal that it may admit of improvement. All departments of the study of medicine are certainly of a more or less elevating character; nor can it be doubted that the honourable practice of it is equally calculated to advance our moral perfectibility. One essential thing is, that we should entertain a just idea of the dignity and importance of medical science. Unlike many others, it derives its rank from its intrinsic value, its extensive utility. Other professions derive a portion of their rank from some connection which they have, either directly or indirectly, with the wheels of government; and they may assist us in the management of our affairs, in protecting us from injustice, or in defending our homes from foreign aggression; but the preservation of health, besides being of more universal application, is superior to any or all of these considerations. Neither of the other professions can, in their most successful achievements, confer happiness, if health be absent; whilst, with health, a well-constituted mind can be happy under almost every other conceivable privation. In a large empire, it must necessarily happen that difference of capacity, and difference of opportunity, whether for its display or cultivation, together with many other things arising out of artificial conditions of society, will at one time advance, another time impede, or altogether obstruct, the path to distinction; but in one thing we may be all alike; that is, the careful study of a portion of those laws which an all-wise and beneficent Creator has established for the welfare and happiness of his creatures, and in applying them, so far as we are able, to the relief of the worst of temporal calamities. In the dispensation of any power we may thus acquire, we should take care that it be sullied by no mean or unworthy motive.

In a liberal profession, we should not be content with according, to those who may give us their confidence, that only to which they have a legal claim, but should endeavour to add to it all the lustre which humane and social feelings can confer on it. We should not consider that we have done our duty when we have prescribed the proper treatment adapted to this or that complaint. We should make it as sedulously our care to alleviate suffering as to remove

disease. Our manners should be artless, kind, and conciliating. We should do our best to cheer the desponding, encourage the timid, and, above all, to restrain the unwary. Lord Chesterfield, who was, as you know, a very good observer of human nature, said, that the value of a gift depends a great deal on the manner in which it is bestowed. I should be sorry to recommend to you such a hollow model for your imitation; but you may rely on it that your advice will, in every sense, be more valuable if given with unaffected kindness and sympathy; I do not mean by a constrained, obsequious affectation of politeness, or a fawning, contemptible demeanour; still less would I have you assume an absurd or pompous gravity; but by an honest, kind, and patient enquiry into your patient's case. I would not inculcate so spurious a morality as that which would found our conduct on our interest; but it would be wrong to omit the fact, that that conduct which best promotes the progress of virtue is not only most promotive of the welfare of our patients, but always in the end of our own also. Notwithstanding the high respectability of the profession as a body, undoubtedly, like all others, it has its exceptions. We certainly occasionally see lamentable instances of what I call low tone. We are too often subjected to impressions which suggest the humiliating idea of a gentlemanly trade, in contradistinction to a liberal profession; and even shocked by examples of the want of that "esprit de corps" which is never wholly absent, among the lowest and most uneducated classes of handicrafts. The love of science, and the support of the dignity and usefulness of the profession, are sometimes merged in a prevailing cupidity; a desire for fame and display is allowed to supersede more weighty and exalted considerations; and sometimes the selection of the profession is regulated more by pecuniary than by moral or scientific considerations. Men, thus actuated, would be more useful in some other departments of a great mercantile community, where their inclinations might be indulged without a compromise of their duties. In diminishing the number of any unfavorable specimens of our own profession, nothing will have the same power as the force of example. In avoiding any temptation to a low tone of conduct, we should endeavour, so far as it is possible, to avoid the suggestions of necessity by a prudent and economical arrangement of our establishments and our expenditure; much greater evils result from neglect of these important considerations than are generally supposed; and it is to be feared that, from ignorance, the public indirectly foster an im-

providence which they are the first to condemn. To those who come to London to complete their studies, I would add a few words. Nothing will secure propriety of conduct in the man so effectually as a due regulation of it in the student; young men, for the most part soberly educated, and well disposed, are all at once plunged into the moral atmosphere of a great metropolis.

They are thus at once surrounded by all the elements of temptation, and, with more money at their command than usual, they are suddenly liberated from that restraint to which they have been heretofore accustomed. With scarcely any previous opportunity for the exercise of self-denial, a student is at once called on to exercise it at every step; whilst he has the power of gratification, and is equally removed from restraint or observation.

Can it then be wondered at, if many are allured from their professional occupations to the waste of their time, the expenditure of their means, and to the injury of their health and prospects. The best and simplest remedy is an immediate attention to the objects for which you come; a few weeks' steady attention will prevent your ideas from being readily diverted from their proper channel; a wholesome fatigue will render the quiet of your home agreeable, whilst a growing information will soon supply you with a pursuit, which, instructive only, and even dry, at its commencement, has already become an agreeable pastime. In all classes there are some idlers, and agreeable companions besides: from a good share of experience, and nothing but a desire for your good, I caution you to avoid them. I would never counsel the avoidance of rational amusement at proper seasons; I regard it, not only as innocent, but necessary. If I had a boy thus situated, I should expect him to give me an account of the best actors, the best musicians, and the best pictures, at least; and also some account, at least, of the best institutions, whether literary or scientific. He who avoids mixing with the world in which he is to live, neglects a powerful means of obtaining a knowledge of mankind; and he who avoids rational pleasures only because they are not wholly free from temptations, but cuts the knot which he has not firmness or principle sufficient to untie. A vicious course is easily avoided at the commencement, and a moderate enjoyment of innocent recreation, without excess, not only best fits a man for the world in which he is to move, but is the best test of moral excellence.

In our conduct to each other, nothing will conduce more to our happiness as individuals, or to our respectability as a body, than a

prevailing kindness and courteous liberality on all occasions: and, in discussing errors, whether professional or otherwise, from which no man is entirely free, we should take care that benevolence and charity are vigilant over our thoughts, words, and actions. It is with real pain that I assert,—but, still conscientiously believing it, I will not shrink from asserting it,—that our profession is extremely deficient in this particular. Our kindness or charity towards each other is too often referable to partisanship, to nepotism, to private friendship, to interest in fact, rather than to those more exalted considerations of principle which would dispose us to regard each other as Christian brothers, carrying out our destinies in the common path presented by a profession which should elevate our thoughts, foster our best hopes, improve our morals, and afford us the noblest subject for the exercise of our intellectual faculties; which should induce us to encourage industry, zeal, and conduct, in whatever quarter we observe them, however humble; and to repress and oppose, in a mild but firm spirit, any of a low, mean, sordid, or unworthy character, no matter however high, or, in a worldly sense, distinguished the quarter whence it emanated; for, the higher the source, the more extensively polluted the stream; the more prominent the example, the more injurious. There is no real charity in concealing vice of any kind when its influence is uncontrolled: the charity consists, not in this, but in the spirit by which our opposition to it is characterized. Should, therefore, any violation of principle present itself, whether it regard the rights of mankind at large, or those of the Profession in particular, we should never repress, so far as prudence allows us, the expression of a just indignation. Should we find, for example, that in any instance, affluence and success had still left a prurient vanity insatiate of gratification; that this led to the performance of professional services on scales of remuneration on which no honest man could live, the motive avowed, being a desire to do good rather than to make money; we should not hesitate to unmask, if occasion required it, the real nature of the case; whether it be from the cause I have stated, or from the pecuniary appetency of trade, which delights in money after it has ceased to require it. I yield to no man in the value I attach to the *really* liberal practice of our profession, nor in the practical recognition of the pride and pleasure we feel in that which most other classes of men would regard as an onerous impost; viz. the claim which the poor and wretched have to our gratuitous exertions. But that is a widely different thing; and, as

the subject is ungracious, I will not amplify it; I will only add, that society is only rendered what it is by the exposure of a certain portion of its unworthy members, nor can particular bodies be kept respectable by any other means. It is quite certain, that one unworthy member of a profession does it more harm than the conduct of twenty good men can rectify. The prevention of improper conduct is, therefore, the only means of keeping the Profession what it ought to be; and this can only be done by a habit of discountenancing any who misconduct themselves, whatever their rank, or our own interests, may suggest to the contrary. If this were general, men would be more cautious, as the punishment would be more certain. Having thus disposed of the consideration of some preliminary matters connected with the conduct of your studies, I proceed to consider the subject of Life in general, and animal Life in particular.

I have thought that a brief recapitulation of each discourse would be useful; and since it is more my object to excite consideration, than to produce conviction, I would direct the attention of the reader to the following propositions:

1. Medicine and Surgery constitute not only a branch of natural science, but also a capital example of "the connection of the sciences," which the expression implies. Their study has not been conducted in a proper manner; they have been too exclusively based on an anatomical foundation, more especially as regards the development of ultimate structure.

2. Morbid Anatomy has been invested with an undue importance; and has, in fact, been regarded as synonymous with Pathology. In connecting symptoms of disease with structural alterations, more attention has been paid to the seat, than to the causes of the malady.

3. Analytical examination of our knowledge of medicine renders its claim to be regarded as a science doubtful, though it must exist as such in Nature. Its surgical branch may, perhaps, furnish an exception, if there be room for one, to this remark.

4. The cultivation of surgery has arrived at a point at which it becomes demonstrable that its further advances require the preliminary improvement of what is more popularly regarded as medical science.

5. The progress of all other sciences has been effected by means

deducible from the plan laid down by Lord Bacon in his Novum Organon; especially by the philosophical observation of phenomena.

6. Experience suggests that common and obvious phenomena are most promising aids to enquiry; and that the examination into the ultimate arrangement of the mechanism of Nature, as a primary step, is rarely, if ever, successful.

7. That, as regards the ultimate ends of medical science, experiments on living animals have hitherto proved as scientifically unproductive as they are morally improper.

8. The rules necessary to such enquiry are contained in Lord Bacon's Novum Organon. In the absence of this, it is useful to regard some simple views as to the nature of facts and conclusions, harmonizing with the plan in question.

9. Violations of these are every where to be found in medical investigations.

10. The evidence of the external senses is to be received with caution, and the neglect of this caution has been injurious to the progress of medical science.

Lastly, I have endeavoured to give some hints on the conduct of the student.

DISCOURSE II.

ON LIFE.

When we survey a living animal, high in the scale of organization, such as man, we observe first the general fabric, of which a sketch is given in the appendix. We see a being endowed with powers of locomotion; of assimilating various kinds of substances to the nature of its own body, and of converting them, primarily, into a fluid convenient for distribution; with an organ for impelling such fluid, various tubes for its conveyance to all parts, and other tubes for returning those portions of it which are not used, to certain centres of vitality, where it may be again endowed with properties fitting it for the nourishment of the body. Further, we observe powers of converting the fluid into various structures of the body; bone being formed in one situation, cartilage in another, muscle in a third, and so on: we observe, also, organs which are destined to separate the old material, and provisions for its expulsion from the system. To these is added an apparatus for bringing all parts into an integral connection with each other, and for conveying sensations which endow us with such knowledge of the external world as is necessary in seeking food or avoiding danger; and which, whilst they accomplish these objects, render the very necessities of the animal contributory to its gratifications. We find, also, that there is a period of growth, during which the size and strength are gradually, yet progressively, on the increase: another period, at which the various offices of life are executed with a sustained energy; and, lastly, a stage during which the vital powers gradually decline. Motion, assimilation, circulation, and sensation in general, become impaired; and, at length, respiration ceasing, they exist no longer. There may be few other visible changes than those to which I have alluded; but life is extinct; the body becomes immediately subject to other laws, is soon resolved into common and more cognizable elements, and again mixed with the ordinary matter of the universe. Now all this applies to Man, in common with many other animals; and it

will be convenient, in limine, to restrict our consideration of man to those characters which he possesses in common.

When death, then, takes place, all the movements of an animal machine, so complicated in detail, yet so harmonious in operation, cease; and it has been a very common enquiry,—what is the nature of that principle which is gone? and which, having bound, as it were, the elements of the body together, now leaves it subject to the influences which affect matter in general.—Now I must say, that I think this enquiry very natural; and, whether it be so or not, certain it is, that the mind will, in some way or other, and to a greater or less extent, enter on it, whatever may be said to the contrary. If, therefore, you cannot arrest such enquiry (supposing that were desirable), it seems very right to endeavour to give it a useful direction.

I cannot participate in the objections which have been urged against investigations of this nature; but as many persons, who mean well, are opposed to them, I will venture on a few remarks, which may serve to place before such persons what appears to me to be the common sense of the matter. I believe it has been one of their notions that these inquiries (by engaging the mind on subjects which they conceive it incapable of understanding) have involved it in a confusion which has led to infidelity.

Now, that the contemplation of Nature—which (conducted in a proper spirit) unfolds to us nothing but accumulating evidences of infinite wisdom, of the achievement of a vast multiplicity of ends by very simple means, of the care which is taken of the wants and comforts of every living being, of such an ordering of inanimate nature as to render it greatly contributory to the same end, and which, further, establishes one series of causes and effects referrible only to intelligent agency, and another series of connections which demonstrate that there has been only one superintending Intelligence—can legitimately lead to infidelity, it is difficult to imagine. To assert this, is to say that it leads to a conclusion at variance with all the facts of the subject, and is equivalent to maintaining that the whole science of natural theology has no foundation. Neither would it be difficult to shew, were this the proper place, how an enquiry into the mysteries of Nature prepares the mind for the proper reception of those of a different kind.

The kind of investigation which I am considering has sometimes been called presumptuous; it has been said that it never was intended that our knowledge should exceed certain limits, and so

forth. This, indeed, may be granted; but the presumption is on the side of those who dare to prescribe these limits, not of those who humbly endeavour to reach them.

It is scarcely necessary to go farther into this question; but the argument in favour of an enquiry into any part of Nature does not rest here; it is by no means merely negative. The proofs that it was intended that we should enquire seem to me just as clear as the abstract argument for the innocence of such enquiry is conclusive; and, if there be such proofs, it follows that this investigation of Nature is not only vindicable, but that, in proportion to our capacities and opportunities, it is an actual duty. Now, nothing can be more indisputable than that the Creator has been pleased to direct the operations of Nature through certain laws, and that many of these are intelligible to man, and to no other creature on this planet. Now, why is this superior capacity given to man? It cannot be for mere purposes of our animal economy, because it is unnecessary to them. A blind instinct would have sufficiently ministered to want, safety, and sensual gratification, as we see exemplified in the rest of the animal creation.

If, therefore, our peculiar capabilities of understanding the laws of Nature have no reference to our economy, as mere animals, they must have some to our conduct as moral beings; otherwise, we arrive at the dilemma of supposing them to be of no use at all. This would be the very acme of error; for, instead of believing that nothing was created in vain, we should be forced to admit that, if not the mind, at least its most distinguishing attributes, were so created. But even this is not all. When we prosecute an enquiry into Nature, the arguments in support of it thicken at every stage of our progress. We are soon struck with the facilities which are afforded us; we are surprised at the analogies between those things which are, as it were, laid open to our perceptions, and those which we discover by observation and reflection alone. I have elsewhere mentioned how frequently the objects of our most recondite search are typified on the surface of Nature; such as the compound nature of light, as exemplified in the rainbow; the invisibility of the most powerful agents in Nature, as electricity, &c.; in the very air we breathe; mechanical adaptation in the whole of the animal creation; our own bodies presenting exemplifications of almost every law unfolded by the sciences. The relations between electricity and chemical affinity, though but recently discovered, are instanced in the effect which thunder and lightning exert on

certain fluids, as beer and wine, a circumstance with which mankind have been at all times familiar. The fructifying parts of plants appear to me also to be surrounded by every thing that, by attracting observation, exciting pleasure, or stimulating curiosity, can invite investigation; and we know to what important scientific ends the study of such parts has been converted.

It seems, then, to follow as a necessary corollary to the foregoing remarks, that, if evidences exist which are perceivable by man only, the function of that organ from which he derives this power was *intended* for such perception; and that it is, therefore, our duty, so far as our capacities enable us, to fulfil this, as well as any other end of our creation, to the best of our power. I do not say that no harm can result from this or any other enquiry, because the injury or advantage of any enquiry depends on the manner in which it is conducted; but I do say that all enquiries into Nature are calculated to extend our views and refine our notions with relation to the great First Cause, and thus to promote our moral perfectibility; and that, in the search after truth, the great point is, so far as the exercise of single-mindedness goes, to be as fearless as regards the authority of man as we are humble towards God. I will conclude this section by an observation of Lord Bacon's, which is quite in point. After saying that an enquiry into Nature does not lead to infidelity, he adds, "for certainly God works nothing in Nature but by second causes; and to assert the contrary is a mere imposture, as it were, in favour of God; and offering up to the Author of Truth the unclean sacrifice of a lie."

If an enquiry into the nature of life were to produce no advantage, unless it terminated in the discovery of that principle, it would be perhaps better to relinquish the investigation altogether. If, however, it can be shown that the enquiry, however unsuccessful with reference to this end, is calculated, when reasonably conducted, to disabuse the mind from the influence of untenable hypotheses, and to contribute to the accumulation of practical knowledge, the case is widely different. We should not, either as teachers or pupils, dispense with any inducement to investigate the laws of Nature. It is not difficult to perceive that this investigation may be made practically useful. The very first element in this enquiry is of the greatest importance; namely, the sedulous observation of facts which it renders necessary; for, if you wish to know what life or any other principle is, you must first attentively note the phenomena it exhibits, in order to refer them to the law under

which they are developed. Thus, the principle of life is one thing; the laws of its operation another; and the phenomena, to which these laws give rise, a third. For example: a muscle shortens itself; that is a phenomenon. When a muscle shortens itself, it evinces a power, it obeys a law; the principle enabling it so to act is its life. The contraction of a muscle takes place in obedience to a law just as much as the power which it manifests when it does contract. Light travels at the rate of a thousand miles in a second. This we consider a law: that its angle of incidence is equal to its angle of reflection, another. Its division into prismatic rays is a phenomenon: we cannot at present refer this to any law; and, as its refrangibility is modified by particular substances, we cannot call this a law, except as regards those substances. However, I merely use the above division in its obvious and ordinary sense; and for the purpose of illustrating the conduct of an enquiry. The phenomenon, that is, the contraction, we see: that it takes place in consequence of a law, we infer, because we know of no exception to its universality as a mode of muscular action; and that both depend on life, we conclude, because dead muscles exhibit neither the one nor the other.

But, in order to obtain clear ideas of the nature of the enquiry, we should not restrict our notions of life to mere animal life; but we should extend our observations to life in general. We only recognize life in an animal under certain laws. Disturb or impede their operation beyond a certain limit, and the animal exists no longer. Regarded in this way, every atom in the universe has its life; that is, it is endowed with some principle which subjects it to certain laws. An animal has no more. In either case, the disturbance of these laws does not destroy the matter, because we cannot annihilate a single atom; but the mode of its existence is changed; it becomes subject to laws apparently different, for they cease to produce the same, or, so far as we can see, analogous phenomena. In this way, we enlarge our survey, by considering not only animals in general, but vegetable and inanimate nature; and, being early impressed with the conviction that nothing is accidental, but that every thing in nature takes place under some law, we acquire not only a habit and facility of observation, but also of endeavouring to discover the particular law of which every phenomenon must necessarily be an emanation.

Now, if we consider the common matter of the universe, we see that every atom exists under certain laws. We find that there

are some laws which all matter possesses in common, and others which seem peculiar to different species of matter. We find, for example, that the masses are made up of certain parts; otherwise, they would not admit of division; and, further, that the smallest particles have certain wonderful properties: we discover that one of these is the disposition to attract to themselves, and to be attracted by, similar particles (attraction of cohesion), and that this power, which seems to increase in proportion to the proximity of the particles, becomes so great when they approach very near each other that they cannot be separated, unless their attraction be overcome by heat, electricity, mechanical or some other force. Matter, thus circumstanced, is in the state we call solid.

Another common property of matter implied, indeed, in the preceding paragraph is susceptibility of expansion. If, for example, we subject it to a certain heat, its bulk becomes increased; and this could not happen unless its particles were farther apart than they were before. When this takes place, we find that, in most bodies, the mutual attraction of their particles becomes sensibly diminished. If we take a piece of iron, or even a piece of Indian rubber, and we wish to alter its shape, we cannot do so without hammering, or some such means in the case of the iron, nor without the exertion of some extensile force in the case of the Indian rubber; but, if the iron be expanded to melting by heat, or the Indian rubber be influenced only in a very slight degree by increase of temperature, we can separate the particles of either with great facility. Still the particles cohere so as to form a mass; but, if we apply continued heat, we find that we separate them still further, until at last their mutual attraction not only becomes less, but actually appears to cease altogether, and they are now as unwilling to unite as they were before difficult to separate. This last condition is best seen in bodies which can be resolved into gases, in which mutual attraction seems to be replaced by mutual repulsion. The ordinary law of their existence in a solid form seems to be suspended or abrogated. Their particles, separating to indefinite distances, meet with other particles which they seem to like better; they attract and are attracted by them, so that new combinations take place, in which the elements are more or less imperceptible to us. Thus, when matter is made to assume the form of gas, unless you receive it into closed vessels, it is soon dissipated, and escapes your observation altogether. Hence it appears that particles of matter are mutually attractive, but that

this is in proportion to their distances; and it would seem that, when this distance is increased to a certain extent, they unite rather with those of other substances, with which perhaps they may be in closer proximity.

Now this indisposition to attraction at certain distances is very remarkable, and may be illustrated by a form of matter with which we are most familiar, as water. Even steam will not resume the attractive force necessary to form water, unless heat is abstracted from it; but the tendency to form new combinations is best exemplified by water when it is decomposed. If, for example, we take oxygen and hydrogen, in the proportions in which they form water, we may conceive that, if we mixed them together in a confined vessel, they would combine; but we do not find that this is the case. They have lost something or other on which their capacity for union depended; and, in order to restore this capacity, we must subject them to some other influence. In their present state, they present phenomena remarkably different from those afforded by water. Instead of being a ready agent for extinguishing fire, they are a most explosive mixture. We find, however, that, if we apply flame, a piece of spongy platinum, or electricity in its more cognizable form, the particles again unite, and water is produced; so that, by separating the elements of water from each other, we have deprived them of their power of reuniting; and, whatever that is, it is evidently the principle by which the particles of water were held in combination. Deprive water of this principle, it no longer exists as water; its life, as it were, is destroyed. Now, as regards our present knowledge, we have already arrived at an interesting peculiarity. It is not meant to be inferred that the principle subtracted must necessarily be the principle of life; but it seems reasonable to infer that it must be a link in approximation to it.

We have analyzed the water, and we have reformed it (the synthesis of the chemist). Now this synthesis we can accomplish, in many instances, with regard to inanimate matter, but never in the case of vegetable or animal beings. We will proceed, however; only remarking, that (without enquiring deeply into the means by which we have reformed the water) we know, at least, that one of them was electricity.

Now, although the particles of matter evince mutual attraction, yet this is very different, it would seem, in different kinds of matter. The attraction is greater in some kinds than others; and

many of those kinds which we are hitherto led to believe to be most *homogeneous* have greater attractions for the atoms of many other kinds of matter than for their fellow atoms. A familiar example of this occurs in the attraction between iron and oxygen. We know that iron will rust, unless we cover it with grease or something which excludes it from the air; the rust being a combination of the iron with the oxygen of the atmosphere. The tendency of oxygen to combine with, or to be attracted by, other forms of matter is still more remarkable; most substances attracting more or less of it. We arrive, however, at another circumstance, if possible still more interesting. Although all substances exhibit certain preferences in their attractions (elective affinity), yet these seem regulated by certain definite laws; for even oxygen, which exhibits such an appetite for combination, will only combine in certain proportions; and these must be certain multiples of each other. Say, for example, that oxygen will combine with one substance in the proportion of 8; it may possibly be combined with others in larger proportions; but then it will be twice 8 or 16, three times 8 or 24, and so on. Now this is surely a very curious thing; and, although the present state of chemical science does not give the power of demonstrating the fact, yet it seems to render it probable that all bodies combine in definite proportions, although these are different in different bodies. A very interesting illustration of the life of matter is presented in the phenomena of crystallization. We see that various substances in a state of fluids gradually resolve themselves into accurately defined forms, octohedrons, hexahedrons, and so on, and that, however finely we may comminute them, their smallest particles still exhibit regularity of shape. We may dissolve common salt, and see all this. Now how is it that the particles of matter are thus brought to marshal themselves with such mathematical accuracy? How do they, in one case, assume an hexagonal, in another a pentagonal arrangement? We can only say that it is in consequence of the law under which they exist; that that law was operating in the solution of which they formed a part; and that the principle whence the law emanated is either the life of the matter, or, at least, a step nearer to it than the phenomena to which we have alluded. When Mr. Hunter spoke of the vitality of the blood, many people had great difficulty (and indeed it has scarcely yet been altogether overcome) in imagining how a fluid of any kind could be alive; yet surely, if they

had reflected on what life of any kind really is, a very little consideration of the phenomena of crystallization alone would have removed it.

A very curious property of matter is elasticity. Perhaps no form of matter is entirely destitute of it; but I allude especially to those instances in which it is obviously and highly developed; as in a piece of gristle (cartilage), or Indian-rubber (caoutchouc). These substances allow their particles to be separated to considerable distances without destruction of their mutual attractions; and they also allow them to be approximated with ease; and yet the original form is resumed when the pressure is removed. Thus, whether they are pulled asunder, or pressed together, their disposition to remain at definite distances is unaltered. Resisting compression by a repulsive, and extension by an attractive, power, elasticity seems to represent the most obvious example of power in the particles of inanimate solids with which we are acquainted. But, after all, nothing seems more strongly to impress on us the definite disposition of matter, and the minute accuracy with which the attraction of its particles obey their respective laws, than the fusion of various substances at given degrees of temperature. We think, perhaps, not much of this fact, because of its very familiarity; yet, when we reflect a moment on the specific point at which their fusion takes place, not merely as measured by the ordinary scales of heat, but with reference to the scale of heat in nature, and that the delicacy of their point of fusion is such as to baffle all our conceptions of minuteness, we behold, in a most striking point of view, the absolute character of the law regulating the degree of heat at which solids assume fluid forms; or, in other words, at which the attraction of their particles is overcome.

Suppose I take a piece of common chalk, which now lies before me. It may have formed, for aught I know, in some former age, part of some animal; or I may even have proof that it has done so, and has consequently been subject to the laws ordinarily governing animal life. It is now, however, a piece of chalk, and exhibits no vital phenomena: true; but it is still subject to laws, just as clearly demonstrable as those under which it executed its animal functions. In the first place, regarded as a mass, it has the common properties of matter, gravitation, &c. It seems to be a very harmless solid, and made up of similar particles. But suppose we pour a little sulphuric acid upon it: what a change is produced! We at once disturb the laws which held its component

parts together, and elicit phenomena of which we should not, *a priori*, have formed the most remote idea.

This apparently innoxious chalk is found to be made up of the most active and deleterious principles. In the first place, its atoms lose the attraction which bound them together. Some go one way and some another. The bubbling occasioned by the addition of sulphuric acid indicates the escape of carbonic acid gas—a matter so far from being innoxious, that, were we obliged to breathe it, we should be instantly suffocated. The sulphuric acid combines with that from which it has separated the carbonic acid, and an entirely new substance is formed. Now, if we examine that with which the sulphuric acid has combined, we find that it is just as different a substance as the carbonic acid is from any other with which we are acquainted. It is, in fact, a combination of one of the most powerful agents in nature—oxygen, with a substance called calcium, and as yet believed to be, like oxygen, an elementary body. The constituents of the chalk which we have examined were united in definite proportions; and in that state have exerted a mutual attraction so rigid, that their connection has existed, perhaps, for a thousand years; and yet under laws so definite, that the addition of a few drops of sulphuric acid has dissolved the connection of ages. Chemistry, of course, unfolds to us innumerable illustrations of the definite nature of the laws governing the particles of matter; and all I wish to impress is, that, whatever principle it may be which regulates those laws, is either to be regarded as the life of matter, or a link in approximation to it. We are apt to restrict our notion of life to existences with which we can connect either motion or sensation, and as a conventional term; or, even as implying the obvious characteristics of animal life, there may be no objection to it. But, when we reason on the principle of life, it seems necessary to regard life in a more enlarged sense, and to consider it more in connection with that general obedience to certain laws, which is manifested not less in inanimate than animated nature.

Now, if we proceed to the consideration of vegetables, we perceive another set of phenomena. Some of these present analogies with those which we find in inanimate matter; others appear to be altogether different. The parts of vegetables appear to be connected by mutual attraction, like those of common matter, and, like it, vegetables exhibit certain preferences in their attractions. Some prefer one soil, some another; some require great moisture, others

scarcely any; and some classes again evince all conceivable intermediate varieties of choice. But vegetables display *peculiar* powers; or, at least, if there be any such in inanimate matter, we have not been able, hitherto, to discover them.

Obscure analogies may certainly be found every where. It might be said perhaps, that, in the oxidation of metals, there is something of assimilation; and that the obstacle which the oxide itself forms to farther oxidation represents something like a power of preservation. We perceive, however, that vegetables have the power of directly assimilating various substances to their own nature; that is, of taking to themselves new matter; and that their bulk is necessarily increased; in other words, that they grow; while, if they lose this power, then life is gone, and they become resolved into their elements and lost to examination. While inanimate matter seems at present to contain a great variety of elements, vegetables are chiefly formed from four; namely, oxygen, hydrogen, carbon, and sometimes nitrogen. That these are their chief constituents we have every reason to believe; but that no vegetable consists wholly of any combination of them is highly probable; for the same reason which prevents us from concluding that oxygen and hydrogen alone form water; namely, that we cannot form either the one or the other by the simple mixture of their respective elements. We require, as I have observed, heat or electricity in the case of the water, and something not yet discovered in that of the vegetable, which, once destroyed, we cannot restore or imitate, except through the agency of some living individual of the same species, or one of its seeds.

But, if a vegetable is to preserve its existence, or the assimilating power on which it so immediately depends; or if we are to produce a new plant from some portion of another, or from its seed, we find that certain conditions are necessary. In fact, it is essential that there be heat, light, and moisture; and although the degrees in which these are required, vary in different vegetables, yet they are necessary, in some degree or other, to all. We prove this by depriving them, so far as we can, of these principles; their absence does not, singly, necessarily destroy life. Seeds will preserve their vitality for years when excluded from light and moisture, at least from any sensible degrees of them; and they will also endure excessive cold, though we know of no mode of depriving any substance of all heat. Still all of these principles are essential to the growth, either of the seed or cutting. The powers

of assimilation possessed by vegetables are very peculiar. In almost every instance, light is essential to them: by a kind of refined analysis, of which we can form no idea but by its result, they appear to derive from light various kinds of colour.

That this is the essential mode in which their colour is produced, we infer from the fact, that if deprived of light, and placed under other circumstances not absolutely prohibitory of their growth, no colour is produced. Their power in modifying many of the most subtile forms of matter with which we are acquainted, is also seen in the multiplied variety of their odours: and, if ever we arrive at a more perfect knowledge of light, or of the principle of odour, it will probably be by some further observation of the proceedings of these wonderful chemists. I have said that they cannot live without air; in fact, they respire, and here their life subjects them to laws both peculiar and striking. We know that the essential element of the air necessary to the life of animals is some proportion of oxygen; and that, whilst they respire air, containing about one-fifth of oxygen, they give off, in expiration, a large quantity of carbon. Now, in vegetable respiration, we all know that, in the main, these conditions are reversed,—that is, that carbon is, for the most part, absorbed, and oxygen given out:—but again, there are periods when the contrary takes place; oxygen being absorbed, and carbonic acid being given out during the night. We have here, then, so many laws of vegetable life; they operate like other laws, and, if disturbed or impeded, are exhibited no longer: the principle on which they depend seems, in some way or other, put aside, and the vegetable is resolved, as chemistry proves to us, into elements common to itself, and to many other forms of matter. All the powers of which I have spoken, and I might have added, others equally wonderful, are gone; and the vegetable, which could not only derive nourishment from such ætherial food, but which exerted so refined a chemistry on the most subtile modifications of matter, exists as such no longer.

Now, if we proceed to consider animal life, we find that it presents some circumstances very analogous to those which we observe in vegetables, and others which seem peculiar to itself. In the first place, animals can no more exist without heat, air, and moisture, than vegetables; and we know not any which can be said to live absolutely without light, *though perhaps there may be exceptions*. A very remarkable circumstance in all animals, whose

organization is not so minute as to be altogether imperceptible to us, is, that there exists in them a nutritious fluid; this is also the case in vegetables. Indeed, in the most simple form of animal existence, the analogies between animal and vegetable life are universal and striking; so that naturalists are not always certain where the one begins and the other terminates.

Perhaps the most peculiar characteristic of animal life, when we are allowed to advance a step or two beyond the point at which they appear to blend, is motion. This, however, is very gradually developed. A variety of vegetable matters exhibit certain motions, which, though they appear to be wholly the result of external causes, and to take place without the exertion of any influence on the part of the vegetable, yet cannot be altogether thus considered. The fructification of many plants depends on the conveyance of the germinating principle from one flower to another: and, where this is carried on in the same flower, we find, in some instances, that very decided motion takes place; the stamina approximating to, or embracing, the pistils. A very plain example of this is seen in the Calmia. Then, again, some animals scarcely move from the spot where they were generated, and possess only such limited degrees of motion as enable them to receive food which is brought into contact with them, as the oyster; or have certain prehensile organs extending but a small distance from their bodies, just a shadowing of increase of motive power, as in Polypi, Sea Anemone, and the Medusa. Still, the distinction between animals and vegetables generally, is broad and striking, since most animals have a decided power of locomotion; and this, in the majority of instances, increased to such extent and variety, that we cannot but regard it, on the whole, as a very distinguishing characteristic of animal life. Nevertheless, it is always developed under laws, although very different in different cases. It is but small, as I have observed, in the simpler forms of animal existence; but it increases rapidly as the organization becomes more complex. In man, we know the power of locomotion to be highly developed; but it is much greater in many animals, in fish, in many quadrupeds; still more remarkable in birds; and perhaps, relatively to their size, greatest of all in some insects. When we consider the locomotive power of a hawk or pigeon, it seems very surprising; but perhaps is not, on the whole, more so than that exhibited by a flea or a grasshopper, or even by an ant or a spider, or in some classes of microscopic animalcules. The power and

rapidity with which motion is developed in these little creatures is wonderful, when we reflect a little on the very minute portion of matter thus animated: when we consider their activity in relation to their size, we can form no conception of any strength or agility like it, as resulting from other forms of animal life. A grasshopper or flea will probably leap a hundred times the length of its own body; and we are quite lost when we endeavour to explain the power exhibited by the ant, in the load which we often see her carrying, so many times heavier than her own body, and this too, with a surprising rapidity.

With motion, the external relations of an animal necessarily become increased, both in number and variety; and we find that proportional additions are made to the various sensations by which these increasing relations are perceived and discriminated. But, although sensation may exist, yet its development is not uniform. Of the modifications of common sensation—as susceptibility of pain, for example—we have no accurate means of judging; those we have, would lead us to infer that it is very different in different animals: but that this is the case with sensation generally, we have clear demonstration. We know that the hawk or the falcon perceives objects at a distance at which they would be imperceptible to other animals. We know that a dog has the power of distinguishing odours in a manner of which our senses no more enable us to form any real idea, than they would if the dog's perceptions depended on a different additional faculty. Many animals—the owl and cat, for instance—are enabled to discern objects in so faint a light, that we cannot distinguish it from darkness.

Most quadrupeds have the sense of hearing much more highly developed than it is in man; and they differ likewise, in this respect, among themselves: the hare surpasses most of them in the quickness of her hearing. Even amongst animals of the same species, nothing is more common than to find this or that sense more highly developed in some individuals than in others. Then, if we take a function which animals possess more in common with vegetables, such as the circulation of nutritious fluid, or the power of assimilation by which this fluid is renewed, we find that it exhibits similar varieties to those observable in functions more peculiar to animals themselves. Some animals can assimilate to the nature of their bodies (digest) only a simple article, as is the case in some insects in their larva state; some can digest many forms, some only vegetables; some, again, only animal food: and

others, as man, can digest both animal and vegetable food with equal facility. Yet the object is the same in all; namely, the conversion of a certain form of matter into the nature of the individual. Some animals have their circulation conducted in one way, some in another. In many, the whole mass of the blood undergoes the change wrought by respiration, before it is distributed to the body; as in man and the warm-blooded animals. In many, only a portion of it is changed, as in frogs and reptiles. In some, it is forced through the various pipes or vessels by an impelling organ, the heart, which may have one, two, three, or four cavities; or there may be no distinct organ of this kind at all perceptible; yet the principle is the same in all. In all, the nutritious fluid is distributed throughout the body; and is exposed, in all, more or less to air; in fact, to oxygen gas.

Some animals can breathe only in air; some, only in water; and a few, equally well in both*: but the end obtained is the same in all. Now, the conclusion to which this cursory survey of a few of the phenomena of Nature seems to lead, is first, that every thing in creation exists under some definite law; and that this is just as true with regard to any atom of what we call inorganic matter, as it is of the most complex form of animal organization: secondly, we observe analogies every where. If, indeed, we take a highly organized animal, and a piece of inorganic matter, the analogies between them are not very striking, though there be many things which they evidently have in common; such as the mutual attraction of their particles, subjection to the law of gravitation, and so on. By resemblances, more or less obvious, all things in nature are connected together; and the connection of all parts of creation, with each other, is just as demonstrable as the unity of any one individual existence.

If we consider man, we find that he is at once connected with an infinity of other creations by relations and resemblances which are very remarkable. In every animal, digestion, respiration, and circulation are very analogous phenomena; in many, they differ not from those observable in man, either in principal or effect. In vegetables, we have nutrition, respiration, and circulation; and, in inani-

* Amphibia, generally so called, are not here intended: these really breathe only in the air; but the Proteus and Draco Volans are truly amphibious, having both gills and lungs, and appearing to breathe indifferently in air and water. Crocodiles, Turtles, &c. breathe in the air only.

mate nature, the component atoms of bodies are subject to laws not less rigid or definite. All matter, whether animal, vegetable, or inanimate, is equally indestructible; all matter has a certain disposition to preserve its life in the form in which we find it in nature, until acted on by influences external to it, the particles of its masses cohering by mutual attraction: all matter has certain tendencies towards other matter. The result at which the mind arrives from this kind of contemplation, is, that the life of every thing, or, *at least, that principle which immediately governs* its phenomena, may be the same.

Now, what this principle is, is a question that in all probability will never be answered, otherwise than by a description of phenomena which are produced by it. Our knowledge of these, however, may not only be very much increased, but it may include the ascertainment of a vast variety of relations, which are at present altogether unknown to us. It is very conceivable, for example, that something like electricity may be the motive principle in living actions; nay, more, it is conceivable that we might ascertain its different distributions or forces to be productive of one kind of life in one form, another in another, and a third in inanimate matter, and yet that we might be as ignorant as ever of the cause of this particular distribution; yet, what a wonderful addition would this make to our knowledge of its laws! I have no intention of entering on a consideration of the various hypotheses concerning the nature of life. You probably know that it has been supposed by different persons to depend on some subtile principle* to which various

* I purposely forbear to speak of agencies as material or immaterial. As for materialism or immaterialism, are they not, after all, words without ideas? They both appear to me to be little more than fanciful distinctions, founded on a grossly erroneous and exaggerated estimate of our perceptions. Who shall dare to mark the line between these two hypothetical divisions? there may be thousands of forms of matter of which we have no senses to enable us to take cognizance, or form the most remote conception, whilst those substances which we should imagine the grossest or most palpable, may be resolvable into some of such inappreciable principles. If our knowledge teach us not, our very ignorance should demonstrate the absurdity, I had almost said the impiety, of our presuming to establish such divisions as those implied in the words material or immaterial. The contemplation of electricity alone is, one would think, sufficiently humbling: in which division should it be placed? Where, in the boundless range of Creation, do we not find its presence suggested to us? Where can we say that it is not in operation? If it is to be immaterial, with what form of matter is it not combined? or, if material, how does it range itself under any of our definitions of matter? The notions

names have been applied; but, as all these seem to me to signify nothing more than the truism that life must depend upon something, I shall not stop to consider them.

The idea that life depends upon organization is more tangible. If this mean anything, it must mean that life is the emanation of the mechanical arrangement of the minute particles in the bodies in which it resides. Now, *a priori*, this view might have been as easily conceived, perhaps, as any other; since we must believe that it would have been as easy for the Creator to have produced life, as the result of mechanical arrangement, had it so pleased Him, as in any other manner; neither would it have been difficult to have conceived life as arising out of some form of matter, since we are not obliged to limit our *notions* of matter to our *perceptions* of it. But the facts we see daily before us not only render it difficult to believe that life arises out of organization, but (for the plainest possible reasons), appear to render it impossible; since, instead of organization producing life, if there be anything clear to the eye of reason, it is that life produces organization.

Now this is not, perhaps, a thing that admits of absolute proof, because we never find life and organization really separate. There is really no such thing as an inorganic substance in nature: every atom has its relations; and the most complex organizations are but the accumulation of such relations: but we see that life has the power of modifying organization; it can convert inanimate into vegetable, vegetable into animal, animal into vegetable matter. It can convert a seed into a plant, an acorn into an oak, an egg into an animal; and a mere spot of animal matter into man—an intellectual being. Besides this, in a seed, life *seems* to exist without organization; in a dead animal, organization seems to exist without life. In fact, the relations between life and organization appear to me to be viewed in the most true light when they are viewed most simply. The principle of life, mysteriously modified, may be the same every where. Organization seems to be merely the mode through

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usually annexed to the terms materialism and immaterialism seem to proceed on a supposed power of analysis to which the human mind is wholly unequal. The one results, as I have already observed, from an exaggerated estimate of our physical perceptions; the other, from an abortive endeavour to supply their acknowledged deficiencies by the exercise of imagination. Were we to agree that the property of matter is the occupation of space, imponderability, mobility, and inertia,—what form is impenetrable by heat or electricity? or shall we say that electricity is imponderable because we cannot weigh it?

which life impresses on different forms of creation their characteristic peculiarities. This seems further probable from the circumstance that all the functions of animals are, in principle, the same; while there is great variety in the mechanism by which they are carried into effect. In fact, to call the phenomena exemplified through the organization of an animal its life, is to confound two very different things. It is as if we should consider the effects of heat, for example, to be identical with the matter that we call caloric, which produces them. That matter, placed in certain mechanical relations, will produce certain determinate effects, may be very true; but what is it that so orders the atoms of this matter to assume certain definite forms and relations, not only to each other, but to all other matter in the universe? If we admit that a certain arrangement of atoms in a muscle, tendon, or nerve, produces resistance, contractility, or sensation—that another arrangement produces the leaves and flowers of a plant, with their various shades and odours—and that a third arrangement produces, in one case, chalk or marble—in another, charcoal or a diamond—still the question recurs, to what principle is the peculiar arrangement owing? what is it that disposes certain particles of matter so to marshal themselves as to produce, in one case, bone, tendon, muscle, or nerve—in another series, wood, leaves, flowers, and various odours —and in a third, the several kinds of inanimate matter?

The aggregation of phenomena which they respectively exhibit, and the laws observable in the development of these phenomena, may well enough be called the life of the respective individuals, as expressing, in one word, the assemblage in question; but the motive principle, on which their primary constitution depends, is no more expressed by the term, than the moving power of a steam engine would be explained, to a person ignorant of steam, merely by a description of the effects wrought by the machine in question.

Further, I cannot think that those approach much nearer to the truth who speak of life as some subtile principle *superadded* to organization. For here the former question recurs—how is the organization itself generated? what is it that disposes particles of matter to form the various structures of a living body? for, to suppose that one principle effects the formation of structure, and another gives it a vital power, not only involves a purely gratuitous and a highly improbable assumption, but, as supposing more causes than are necessary to produce the effects, is unphilosophical and contrary to all analogy. It has been suggested by Mr. Abernethy,

in advocating Mr. Hunter's opinions on the subject, that life may have been added to organization in the same manner that electricity is to a wire in an experiment; but this is passing over the difficulty, since it dismisses altogether the question, how the organization itself was evolved? Therefore, if such a principle be the life of an animal, it must have influenced the arrangement of its atoms as well as the phenomena which they exhibit when arranged. This may certainly be true; but that electricity, or any other principle, should have been superadded to organization already developed, seems, in the highest degree, improbable.

If, however, our enquiries into the nature of the living principle should only produce a negative result, in the present state of our knowledge, and determine only what is not life, still it disabuses the mind from error; and, in many subtile enquiries, experience shews that the determination of what this or that thing cannot be, enables us, by contracting the field of our enquiry, and by disencumbering the object of our consideration, to arrive at the discovery of its real nature. That this will never happen with regard to the living principle is very probable; but the hope that we may, by a course of reasoning which often discovers the real nature of many things, approximate more closely to the knowledge of life, seems far from being unreasonable.

Now, if the contemplation of Nature unfolds to us that all atoms in the universe are mutually connected by their relation to some law or other (and the unity of the First Cause is clearly demonstrable on this kind of evidence), it follows, *a fortiori*, as a matter of high probability, that principles, which we have reason to believe the most universal in their operation, must be, in some way or other, connected with so large and so important a part of creation as that represented by animated beings.

We often find in books, and books of great character too, this or that being, spoken of as more *beautiful* or more *perfect* than another. We may be excused when we smile at such implied attempts at comparison; but it is quite conceivable that, with a pervading perfection in all beings, some may be in their uses more or less *subordinate* to others. We cannot fail to be struck with the evidence that the animal creation, viewed in this way, holds a very high rank in the scale of existence; and this, whether we regard the provision which is every where evident for the supply of their wants and gratifications, or the power which they evince in availing themselves of such provisions. The arguments for the

rank which they occupy might be extended far beyond the limits of any work not expressly designed for such a purpose; even those furnished by the geological history of the globe are sufficient for a volume. That animated beings yield to no other class of existences is at least sufficiently evident.

Now, then, if we consider those principles which appear to be in the most universal operation, the progress of enquiry seems always tending to diminish their number, until, at length, they appear to be very few. In fact, of principles we scarcely recognize the universal presence of more than two; and these we find evident every where: I mean gravitation and electricity; but, as the former seems to be much modified by the relative distances of the particles of matter to each other, and by other circumstances, having very remarkable relations to electricity, it becomes, indeed, very doubtful whether they are not one and the same thing. We may, at least, reasonably infer that electricity is the most pervading principle in nature of which we have any cognizance. To consider electricity in all its known relations, either of power or analogy, would lead me very far from the present subject; but it may be useful to mention a few of them.

If I suspend, by means of a piece of dry silk, a light substance—say a ball of paper, or a ball of very thin Indian rubber—and then rub a glass rod perfectly dry with a piece of silk covered with a little amalgam, and if I now make the glass rod approach the paper ball, I find that it first attracts the ball, and then causes it to fly off or be repelled. The ball that hung by the silk, in obedience to the laws of gravitation, gravitates no longer; motion is communicated to it, and this in various senses, according to the direction in which I hold the glass tube. Now the remarkable thing here is, that the electricity suspends the law of gravitation—suspends, in fact, the operation of a law which ordinarily pervades everything in nature. To estimate the importance of this simple phenomenon, we must recollect that the law of gravitation is that which holds the celestial bodies in their orbits, just as certainly as it enables the chalk before me to lie upon the table. But, however extensive our idea of the power or influence of electricity may be, from the consideration of this circumstance, we find that farther examination tends only to confirm our conviction of its universality. Sir Humphry Davy shewed that the various phenomena in the inorganic world, included under what we call chemical affinity, really depended on actions which were electrical; and, although it has not

yet been shewn that *all* chemical actions are demonstrably electrical, yet enough has been done, not only to render it in the highest degree probable, but, I believe, to leave no doubt on the minds of those who are most capable of judging on the subject. Sir Humphry Davy shewed, that, if an alkali be endowed with certain electrical properties, it can be made to pass through an acid without change—a palpable suspension of the laws of chemical affinity. The power, too, which electricity has of decomposing many bodies, shews that it also possesses the power of overcoming chemical attraction. The exertion of this force, as one purely electrical, has been, I think, still more demonstrably shewn by Mr. Faraday, who has effected decomposition with Voltaic electricity without contact. Further, it may be shewn that chemical actions, when excited in any other way, are attended by a disturbance or evolution of electricity; the various phenomena thence resulting, constitute what is called electro-chemical science, which, if it do not demonstrate, induces us to conclude, on the ground of a most reasonable probability, that all the attractions (of which I have before spoken) between the atoms of various kinds of matter, and consequently all the phenomena of chemical affinity, are, in fact, dependent on electricity.

The consideration of the dependence of vegetable life on air, moisture, heat, and light, suggests to us, in the strongest manner, the presence of electrical agency; as regards air and moisture, from the general influence of electricity, and, as regards heat and light, from certain peculiar analogies which are evinced between electricity and the two last-named principles. The greatest heat which we are capable of producing is obtained through the direct agency of electricity; nor is the light, which is directly derivable from it, less remarkable. The rapidity of its motion is so great as to be absolutely beyond our perceptions: we are wholly incapable of measuring the interval of time during which it travels from one end of a wire to the other. There is nothing like this but the rapidity of light. The fact, too, that the different prismatic colours have different electrical properties*, and these in some relation to their refrangibility, is another fact which strongly suggests to us the existence of some mysterious yet certain connection between light and electricity. The experiment, also, of the Abbé Nollet, as related by Dr. Priestly, in his History of Electricity, shewed that

* See Mrs. Somerville on the Connection of the Sciences.

vegetation was decidedly accelerated by electrification; so that, however obscure its mode of connection with vegetable life may be, there can be no doubt of its presence or its agency. I have thought that our knowledge of the relations of electricity to light, and of light to colour, might be extended, if flowers were made to blow under various prismatic colours, and under different electrical influences; but, although the proposition has been thought promising, I am not aware that any experiments have hitherto been made; and I regret that I have neither time nor convenience for conducting them myself.

The consideration of animal life in connection with electricity unfolds so many circumstances, bringing them into certain intimate relations, that the presence of electricity in an animal body can no longer be doubted; and, if the subject were to be pursued in the spirit which advocates a particular opinion, it would not be very difficult to shew, that, as electricity is the next power in regulating the laws of chemical affinity, so is it the highest link as yet discoverable in the chain of causes between the principle of life and the phenomena which it unfolds to us.

But my desire being rather to remove erroneous impressions than to establish any particular doctrine, rather to prepare your minds for truth than to pretend to furnish you with it in this matter, I shall simply state one or two facts evidencing the connection of life with electricity. The general probability of such connection I have already inferred, from the universal agency of electricity and the ubiquity and importance of animal life. The particular evidences are, perhaps, more striking. You have seen that electricity suspends the laws of chemical affinity, and this, both by preventing the separation of parts, and also by effecting, on the contrary, their decomposition. In both of these respects, the actions of life are equally remarkable. If a piece of animal food be presented to the stomach in a state of commencing decomposition, this process is stopped previous to the solution of the food by the stomach's peculiar actions.

As its solution proceeds, it acquires new properties, and is ultimately converted into all the various parts of which the body is composed. The rapidity of the actions of life is very great, and especially in the conveyance of sensation. An impression is conveyed to the mind from a distant part of the body; the part is moved, in consequence of that impression, by a mandate from the brain; and all this takes place in an instant. Yet nothing is more

susceptible of proof than that the impression and command must have travelled from the foot to the brain and from the brain to the foot; nor anything more demonstrable than that the nerves were the media through which they were conveyed. Now in electricity we have the same rapidity of motion; so that, if it be not really the instrument of communication, it would, at all events, appear to be one not inappropriate for such purpose. When we touch the trunk of a nerve, and disturb its life, we feel a sensation like that which is imparted by electricity.

The two sensations, as such, are identical. We cannot restore life by the agency of electricity; but we can produce effects which are exceedingly like vital phenomena. We can make muscles contract, after death, by electricity; and even the chemistry of the body has been, in a degree, continued by the same agent*. Moreover, as we can thus renew by electricity muscular contractions after death has taken place, so can we, through the same agent, render ordinary contractions more vivid whilst the animal is yet living. So far, however, as regards some kind of connection between life and electricity, we are not obliged to rely on mere general analogies; since, in some animals, electricity is as plainly developed as in a Voltaic battery—there being, in fact, a power in the animal of giving electric shocks, as in the Torpedo and in the Gymnotus Electricus.

Now this, I suppose, is what Lord Bacon would have called a glaring instance; and, as it is one which is calculated to lead to some error, I shall speak my sentiments on it very unreservedly. When we consider the universality of electricity, and still more the powerful agency which it unquestionably exhibits in animals, and at length arrive at the discovery of an animal endowed with direct electrical properties, our growing conviction of the intimate connection of this principle (electricity) with that of life, is apt to end in the conviction of their identity. I do not mean to assert that they may not possibly be the same; but I do assert that the facts do not justify the conclusion; and least of all that one, which is perhaps of all the most striking, namely, the presence of electricity in an organized body. We see, in the electrical organ of a torpedo, an abundant supply of nervous matter; and the arrangement of the matter presents, indeed, analogies to the Voltaic

* Dr. W. Philip, in The Philosphical Transactions, and in Experimental Enquiry into the Laws of the Vital Functions.

pile: several very large nerves are distributed to it; but the apparatus itself, and the power which it develops, are just as much parts of the animal, and products of life, therefore, as its liver, stomach, or any other organ, with their functions.

Therefore, the circumstance of a particular organ evolving electricity in an animal, no more justly allows us to conclude that electricity is life, than the presence of a liver, a stomach, or a musk-bag, would authorize us in stating, that either bile, the gastric juice, or musk, was the vital principle. On the contrary, we should rather conclude that, inasmuch as these, and therefore *electricity in common with them*, are products of the living principle, they *must be subservient to it*. Although it should be admitted that this function in the torpedo, and the universal residence of electricity in animal bodies, prove the analogies between life and electricity; or that electricity is some principle more proximate in its nature to animal life, than any thing else of which we are acquainted; we are far from having arrived at the establishment of their identity. The only conclusion to which we can reasonably come, is, that electricity is subservient to life, or to some superior law, which regulates it in one way in the inanimate kingdom, in another in the vegetable, in a third in the animal; and that it is so entirely under its influence in the torpedo, as to be evolved by it from a living battery. That electricity may be a vital agent in all, is perhaps probable; but whatever so variously regulates the electrical powers, whether it be in the original laws governing the atoms themselves, or in something which measures or directs the electrical agency, must evidently be, if not the vital principle, at least something a link nearer to it than electricity itself.

Indeed, it is obvious enough, that the mere superaddition of electricity does not constitute life; for if electricity be allowed to be the agent in building up the structure of the body, or in exciting its functions, still the question recurs, how such a subtile principle should be regulated as to produce phenomena so determined, and yet so different in the different orders of existences. We are here obliged to refer to some superior agency, just as we are when we moot the question of definite quantities or chemical affinity. Those who can imagine no other secondary agencies, would at once refer to the First Cause—the fiat of the Creator. I am far from thinking that we have reached such a height in knowledge as to justify us in considering that we have arrived at the ultimate link in the chain of causation: indeed, I instinctively shrink from

such a conclusion, as one fraught with presumption; and I believe it to be one, which those who think most, would hesitate most in adopting. There may be principles in Nature, for ought we know, that we not only have not yet discovered, but of which we have no idea; our knowledge, even of electricity, as compared with the age of the world, is itself but an affair of yesterday*.

I shall pursue this subject no farther; my object has been, merely to prevent your minds from being influenced by untenable hypotheses, and to shew that there is no one theory, as to the nature of the vital principle, on which we can safely rest a conclusion. But the sooner you contemplate the *phenomena* of life, the sooner you will be employed in the acquisition of knowledge professionally useful; whilst, as I have before observed, you will be occupied in that kind of enquiry, which, with regard to life itself, promises to lead us to the purest notion, if we are ever to arrive at any, of its real nature.

What we have to do with life is to study its phenomena, with a view to ascertain the laws to which they are to be referred, and to regard the body as the arena of their operations. It may be very necessary to examine the structure or mechanical arrangement of the different parts of the body (anatomy), to trace their uses (physiology), and to observe their different appearances in disease (morbid anatomy): but all, or any of these, are only useful in proportion as they are subordinate to, or as they facilitate, the contemplation of the body as a whole. I wish most particularly to impress this on you, because, on your having a due and deep conviction of it, will not only depend your acquisition of that which

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* So, with regard to heat,—nothing is more impossible than to separate heat from life,—we know of no instance of life without it; and, on the other hand, we see the most striking proofs of their intimate dependence or connection. Not the least circumstance is, the universality of the connection, not only with one, but with every kind of life: but when we are carried by these considerations to that point which involves the question of whether heat is life, we find the very same difficulty as we do in regard to electricity. What is it, in fact, that makes the heat of one temperature essential to such vast numbers, which would certainly destroy equal multitudes of other creatures? Whence results the wonderful and varied power which animals possess of maintaining their characteristic heat in media of such varying temperature? All these, and many other queries, oblige us to suppose, nay, to be convinced, that something must regulate these peculiarities; and whether that be life or not, it is obviously one link in the chain of causes nearer to it, than is heat abstractedly considered.

is at present attainable, but, I verily believe, any chance of extending the bounds of real science.

You are to observe how the body is influenced by various external causes—by the air we breathe—as characterized by varieties of heat, moisture, or any peculiarity by which it produces effects on the surface of the body; secondly, you are to observe how the body is affected by articles introduced into the stomach, whether they be food or medicine; and, thirdly, you are to observe the influence of moral causes. Of these we see certain types in other animals, it is true; but they occur with much greater force and frequency, and in much greater complication, in man. However various the agencies external to the body, which produce disease, may be, there is the strongest reason for believing that they never produce disease in all those who may be subjected to such agencies. The most prevailing diseases, or the most fatal epidemics, equally support this assertion. Neither do we find that these agencies produce disease, even in the majority. Perhaps we have hardly one authenticated instance in which the most deadly epidemic did not leave more persons untouched than affected by it: be this as it may, there are always many who escape. In other words, how is it that many enjoy health with persons falling ill all around them?—I need scarcely say that there must be *some* cause—I need scarcely say, that a man can no more be in health without cause, than he can be ill without cause. And yet, truism as it may appear, I incline to believe that the most important investigations must take their rise in the sustained conviction of this simple proposition. We have endeavoured, with what progress let the state of science declare, long enough to preserve health by enquiring into the *proximate* causes of disease; let us now, at least, include in the investigation, an endeavour to relieve diseases through a more precise investigation of the causes of health. Let us, in fact, apply that mode of investigation to the whole body which John Hunter so successfully applied to certain parts of it. Let us try whether we cannot at least extend the character, which John Hunter was the first to impress on the primary investigations of surgical science, through every part of its application; and try what the same enlarged mode of enquiry will produce in regard to achieving some progress in medical science, on which the further advance of surgery now depends.

We are not, therefore, to confine our observation of disorder-

ing agencies to those examples in which they produce disease. On the contrary, we shall often obtain more useful knowledge, if we *begin* by observing what happens where the body is subjected to their influence with impunity.

We must, in fact, study the phenomena of what we cannot distinguish from health, if we wish to understand what we cannot but regard as disease; and, in studying healthy actions, not confine ourselves to the mode in which granulations, or pus, or any other form of matter, is generated, but extend our observations to the ascertainment of the condition of the different organs of this great machine; examine what the respiratory, circulating, digestive, and secreting systems are doing, and this *both relatively and absolutely;* the contemporaneous condition of the nervous system, and every manifestation afforded by its superintending power, both that which we consider corporeal, as well as that which we regard as mental. Then, in diseased conditions, we should observe, not only what this or that organ, the disorder of which may be chiefly, or perhaps solely, manifest to us, is about, but the state of every other part within reach of investigation. If this mode be really followed, even as far as we are at present capable of doing, I feel certain that much clearer and more simple views of disease may be obtained than those usually in circulation. But these remarks are general: my object is to teach: I will therefore try to shew you how to set about the work in question. And, first, I think you may, as a basis, assume the following data:

That the body contains, within itself, certain powers of preservation, of maintaining an equilibrium under a variety of disturbing influences; that diseases, in all their diversified forms, are, in fact, but actions of this preservative power*; and that the operation of the latter takes place, subject to certain laws of limitation, of which

* There is no objection, in the abstract, to the assumption that any process of a living body has *a tendency* to preserve that body: the objection, if we examine it, arises from the fact, that many of the processes we actually see, end, practically, in the death of that body. Neither do I make the assumption permanently as such: I wish you to take it as a sort of temporary structure, subsequently to be withdrawn, unless it be supported. If, in fact, all diseases ended in preserving the body, the assumption would be undeniable, the rule absolute. Hence we must, to retain the assumption at all, either prove the rule absolute by the simple fact which I have mentioned, appealing to its invariable success, or by explaining the exceptions. Now, as we cannot prove that diseases are successful, since they so often prove fatal, we must, to sustain the principle, rely on the success which we may be able to arrive at in the explanation of such exceptions.

our present knowledge enables us to form no very correct idea, many diseases being incurable perhaps only in consequence of our ignorance. The only essential limitation of preservative actions with which we are certainly acquainted is exerted by Time and a variety of violent agents, chemical or mechanical, which at once destroy the whole machine. Many diseases, indeed, appear at first as so many instances of limitation to the powers of life; but consideration shews us that the preservative force, like every other law, implies the presence of certain conditions, and that the absence of these conditions, and not the absence of the law, produced the apparent limitation of it. In almost all diseases which we accustom ourselves to think of as identical in their essential characters, we find a great number of persons who die, and a great number who recover. Now nothing can be clearer than that this simple fact involves a truth of great importance; namely, that the deaths did not take place from any abstract fatality in what we regard as the disease, but from the absence of certain conditions, whatever they may have been, which were present in those who recovered; and that the success of the attempt at preservation in the one case, and its failure in the other, was determined by these conditions.

If, for example, two forces, in themselves identical, operate on two different bodies, and produce dissimilar effects, it necessarily follows that the difference in the effects cannot be due to the forces themselves, but must be referred to the objects on which they act. So, if unhealthy states of atmosphere, or any other causes, produce extensive disease in any population, and some recover, while others die, common sense shews that (by means of ordinary inductive reasoning) the different result must happen, not from any peculiarity in the common cause of the disease, but from the various conditions of body, no matter how characterized, in different individuals. I am the more desirous of impressing this on you, because, though apparently a truism, it is a matter of vast importance, as you will see hereafter*.

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* The various modifications of vital actions, presented in the inhabitants of different countries, seem calculated to throw considerable light on the causation of disease. Although the opportunities of investigating these points can be enjoyed but by comparatively few persons, yet it does not appear that even those which have occurred have been cultivated with the requisite attention. It seems probable that the treatment usually employed by our Continental neighbours, the French, would scarcely admit of successful imitation in this country; that, in fact, until we know something more of the real causes of acute affections, a more active treat-

Now, inasmuch as we are all daily subject to some disturbing influence or other, and yet, in the majority of us, the functions of life not only proceed apparently undisturbed, but in a manner consistent with health, comfort, and enjoyment, how is it that Life thus resists the various and violent impressions which are so constantly acting on our physical and moral constitution? All this requires more sedulous attention than has been hitherto bestowed on it. The observation of the manner in which Nature's operations are carried on in the most trivial local diseases, has been most valuable to us. We are often enabled to conduct our treatment, to direct our vigilance, to prognosticate results, from the simple knowledge of Nature's proceedings in the most common injuries, as in heal-

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ment will be necessary in this country than in France, where again, perhaps, the more active practice usually pursued in this country would be scarcely an improvement, if it were even admissible. The influences by which the actions of life are modified in different countries seem, so far as they are external, to be referable to climate and mode of living; but we cannot say that moral influences may not have considerable share in the business. Those, also, whatever their nature, which confer nationality of character, may also confer characteristic types on the actions of disease. Another promising mode of enquiry, and which, indeed, may be regarded as a branch of the foregoing, consists in the parallel which might be drawn between the various modes of living adopted at various periods, in the same country, and the characteristic diseases of the respective periods. We know that certain forms of disease, at one time very common, become, at another, comparatively rare, and vice versâ. I cannot think that a sedulous cultivation of this subject would be unfruitful. Variations in climate, carefully ascertained, compared with simultaneous improvements in cultivation, draining, &c. would probably form an important section in such enquiry. If, for example, we could connect any prevailing character of diseased action with general habits of luxury and refinement, it would strengthen many of our present views; whilst the co-existence of peculiar modes of life might help us to a truer perception of the causation of particular diseases. An interesting example, in connection with the last-mentioned part of the subject, is the relation which chimney-sweeps' cancer bears to a particular calling; and the closeness of the connection (which I shall again advert to in another place), though, as yet, it has not been well investigated, is further illustrated by the fact, that a disease, so common in London, where we burn scarcely any thing but coal, is scarcely known, if indeed it exist at all, in Paris, where they burn but little. But the consideration of moral and physical influences, on the enlarged scale glanced at in the foregoing observations, might very conceivably conduct us to a far more elevated position, than the comparatively humble or limited objects with which we commenced such enquiry might lead us to imagine. Supposing, for example, that, in the extended search for facts (the ground-work of inductive philosophy), we were to discover that the diseases of animals in a state of nature were extremely few or rare—that they were produced by natural and unavoidable agencies—that the preservative powers of the animal economy were almost invariably successful—that certain facts, referable to the mental constitu-

ing wounds by adhesion or granulation. If, then, so much benefit result from the observation of a single feature in her operations, may we not hope, as I have already hinted, for results still more important, when we observe the mode in which she so generally preserves that exquisite harmony in the system, which, without any assistance from without, and often in spite of considerable interference within, maintains, out of millions of beings subject to daily sources of disturbance, thousands in health for every one that is deprived of it?

No one can doubt that such organs as the stomach and liver, heart and lungs, bowels, skin, and kidney, are very important organs in the animal economy. The announcement of such a truism excites a smile. But there is another fact, scarcely less familiar; that, of a vast number of persons whom we see every day, not only without suffering, but in the actual enjoyment of existence, there are very few in whom all the organs, which I have mentioned as so important, are perfectly performing their functions.

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tion of these animals, although they rendered them subject to certain disturbances of a moral kind, as love, anger, aversion, and such like, yet that the exercise of these forces, as they were under the influence of a blind instinct, could neither reasonably justify the idea of their abuse, nor were in practice found to be productive of disease—and, again, in another class of animals (man, for example), we found, first, a responsible volition, associated with his moral constitution, and, simultaneously, a multitude of diseases, in which Nature, if unassisted, proved often, perhaps generally, unsuccessful—that these new forms of physical disturbance involved, either on the part of the individual or his parents, or both, infraction of laws referable to his moral attributes—and that if, however ignorant we might still be as to the whole chain of causation of such forms of physical disturbance, yet that, even in animals, in which we could not naturally discover them, we found certain types of them produced when such animals were in a state of domestication, involving certain imitations, as it were, of these moral infractions—and, further, if we found that, in man, the best treatment of his diseases really involved a tracing back and connecting any number of links in the chain of moral aberration—we should indeed come to a point in the path of enquiry, where every step opened to our intellectual foresight views of increasing truth and beauty, and which would possibly unfold to us, not very unreasonable anticipations, that medicine might one day be raised, through the path of legitimate induction, into a branch of moral rather than physical philosophy—raised, in fact, from the lowest condition as a science, to an elevation superior to most others. It would render, in short, that to which we restrict our notions of *disease*, a physical result of moral infraction; and, in confining that practice of medicine which was really necessary to a retracing our steps, through the instrumentality of physical agencies, to the laws we had infringed, confer on it the lustre of a practical morality. The philsophical reader will easily perceive that much of this note is far from hypothetical.

Now the observation of these truisms is trite enough. I apprehend the reconciliation of them has not excited much attention; yet, if they be facts, they must be reconcileable; and the demonstration of their consistency must be important, because it must, from the very nature of the question, develop some part at least of the process by which Nature herself preserves us in health.

Now a great deal of this is very beautiful; it is very simple, and, what is more, it is intelligible by the most ordinary capacity, and, in *a great measure, attainable by those who have not studied medicine as a profession.* Usually our enquiry into the causation of disease commences only when the disorders of the system are accompanied by some degree of suffering, and, for the most part, when they have produced absolute pain.

We now find that either the organ to which pain is referred, or some other, has manifested irregularity of function for a considerable period; but we by no means necessarily discover how the disorder, which may have been consequent on this irregularity, or which, at all events, has at length succeeded to it, has been postponed. Could we do this, and I feel confident that a more accurate observation of those who are said to be in health would enable us to do it, I have no doubt that we should discover connections between different organs in different individuals, producing more useful knowledge, in the treatment of disease, than has resulted from all the experiments on living animals that have ever been perpetrated—that the enquiry, by shewing us how the processes of Nature are modified by the idiosyncrasy of individuals, would not only unfold to us much of the difficulty by which our most cautious, and ordinarily most successful generalizations are attended, but that it would discover enough to convince even those who trust too exclusively to their external senses, of what appears (to such persons at least) inexplicable, if not untrue—I mean how the constitutional origin of local diseases (accidents excepted) is universal, notwithstanding that many local affections occur in persons who are said to be in good health.

Having given some consideration to this subject, I will tell you what I have observed with regard to it, which will, at all events, illustrate what I mean, and teach you how I intend that you should conduct the enquiry. When I find a man saying he is in good health, that is, that he is free from any kind of bodily suffering, and he tells me, the next minute, something which clearly demonstrates that some important organ is performing its function imperfectly,

minute enquiry seldom fails to elicit the organ on the compensating influence of which his health has depended. One man will state that his bowels do not act above twice or thrice a week; but that, he will say, is common with him. If the enquiry be directed to his skin he will reply that he is all right there; that he "perspires gloriously;" that the least exertion induces perspiration; and that often, in the night, you might "wring his night-shirt." Disordered biliary secretions, and the explanation of the continuance of such a state of things for some time, are, in many cases, demonstrable where the patient makes similar observations. Where the bowels have been habitually torpid, without derangement of the system, you will almost invariably detect that the skin or kidney, and sometimes both, have been manifestly doing more than their share of duty. This, too, is sometimes to be inferred from the quality, at others from the quantity, of their secretions, and most commonly from both, presenting obvious departures from the healthy standard. Many persons, whose circulation is so irregular, that at length palpitations of the heart, or some other marked disturbance, induce them to seek advice, exhibit, on examination, evidence that they have laboured under irregular biliary function for some time, without any of the *usual* sufferings consequent on disorder of the liver. In these, however, you will scarcely ever fail to discover that the disturbance of the heart, and that of the liver, to which it appears in the individual case to have been secondary, have been relieved, either by profuse perspiration, by an increase of urinary discharge, or, in some cases, by temporary depressions of the nervous system, characterized by a much enfeebled condition of the general functions of the body. There are, also, what appear to be very sufficient reasons for believing that, in many cases, a great quantity of injurious, and perhaps even fæculent, matter is eliminated from the lungs, or perhaps even from the superior portion of the mucous passage leading to the alimentary canal, as the mouth, fauces, and œsophagus. The facts pointing to this conclusion are, first, the frequent exhalation with the breath of odours that experience shews us to be as unnatural as they are offensive; and, secondly, the combination of this circumstance with two others, apparently very inconsistent with each other, namely, a feeling of health on the one hand, and indisputable evidence that some organ is not performing its functions naturally on the other.

I have known many examples of the kind above mentioned, and I have tried to discover how far fœtor of breath was connected

with this or that organ as to order of frequency; but the difficulty of the subject, and the extensive observation required, has not allowed me to arrive at any results of practical importance. It has *appeared* that peculiar fœtor of breath is more *frequently* connected with disordered bowels or liver than with derangement of any other organs; but I cannot assert anything confidently on this point. It is important to remember, that, in disordered conditions of the body, in which noxious matters may be exhaled with the breath, the same odour may characterize the exhalation where the organs affected appear to be different. We usually, also, attach a characteristic odour to the impregnation of the system by mercury; but I have seen a number of cases in which the fœtor exactly resembled that occasioned by the administration of mercury, but in which no mercury had been administered.

It is said that, in some cases of suppression of the urinary secretion, the exhalations from the lungs afford, as well as the secretions of the skin, an urinous odour. The phenomena comprehended under what is called vicarious secretion, in which one organ undertakes the duty of another, as the breasts that of the uterus, are but instances of the compensating power to which I have alluded. I knew a gentleman who had an uninterrupted state of good health, the only exception to it being that he was a bad sleeper; but his breath was always, in the highest degree, offensive, and such as would suggest to almost any one that something very injurious was in this way got rid of from his system. But that interchange of function, of which we shall find, as we proceed, abundant other illustrations, has certain limits to the operation by which it so beautifully preserves the health of the body, notwithstanding the imperfection of certain of its organs. One organ cannot *perpetually* discharge the functions of another.

This unnatural state of things finally disturbs the whole animal economy; and that very connection and consent of action between different parts, which contributed to dispose of noxious influences through the agency of different organs, now renders these very organs so many links of a chain for the extension of disease. Now there can be little doubt, that, in the removal of disease by artificial modes of proceeding, it must be of great importance to ascertain in what way *Nature* has so long postponed its occurrence, even when important organs have not performed their functions perfectly. The more you reflect on this subject, the more will you

be inclined to the opinion that all diseases are to be regarded as certain processes of life, having for their object the safety of the individual.

Nor is there any fear, as you will see when I come to treat of practical matters, that, in our present state of knowledge, such a view will in any way interfere with the energy of our practice, much less that it will lead to inertness in our treatment. The practice to which it leads is not so much one which requires less hand, as one which requires more head. It does not diminish our forces, but it tends to increase them by giving them a proper direction. It does not, for example, interfere with the most active treatment of inflammatory affections; but it adjusts its value as a means of removing dangerous symptoms, and carries our views beyond the abridgment of those actions which are immediately threatening to life, to those principles on which depends the prevention of the recurrence of diseased action. Without this, the most successful removal of acute diseases often entails prospective derangements of the system; which, if they do not destroy, at least seriously impair, the enjoyment of that life which, for the time, we may have preserved. In many cases, in the present state of our knowledge, we are obliged to take enormous quantities of blood, and to saturate the system with mercury. Now, is it reasonable to suppose that the abstraction of an enormous quantity of this highly elaborated fluid, and the simultaneous superinduction on the system of a mineral poison, are negative matters? I say, is it reasonable, *a priori*, to think this? If, however, you have any doubt on the subject, I promise you ample demonstration that the fact is far otherwise. For the moment, let the facts already published by others, and some by myself (and I shall hereafter cite many additional ones of very conclusive character), answer the question. But to return. In regarding diseases as the operations of a power preservative in its tendency, the question naturally occurs, why Nature, when left to herself, is so frequently unsuccessful? To answer this question perfectly, our knowledge of the operations of life should also be perfect; and our assurance that *we really* do leave Nature to herself equally so. But the preservative tendency of Nature's proceedings—not to mention that they are daily successful in a great variety of diseases—may be inferred from this fact, that, just in proportion to our ability to remove impediments to her operations, so is our practice; or, to speak more philosophi-

cally, so is her preservative power uniformly successful. I say *uniformly*, because, were it not so, our reasoning on disease would be apt to be very fallacious.

We can arrive at no law except where we either can obtain uniformity of result, or consistently explain its absence*; unless we observe these conditions, we shall be in danger of applying the law to phenomena to which it is inapplicable, or of considering the law inapplicable when it is still in operation. The truth is, that a very simple view of the subject appears to explain very satisfactorily how the preservative powers of Nature, as manifested in disease, require assistance in their operations. That the preservative power of the body may have been amply sufficient to protect it, under the influence of those disturbing causes to which it is *naturally* subjected, is perfectly consistent with the fact, that the same power may be wholly inefficient to the removal of disturbances, the result of luxury, intemperance, refinement, or immoderate indulgence of the passions; and the more, if these agencies act, as they most commonly do, in combination.

We find, in fact, that, in savage life, diseases are few and simple; and while this, though generally true, will vary in its application to localities where natural causes render particular districts more or less healthy, still the general truth seems impregnable. Celsus, after stating that, amongst the ancients, Machaon and Podalirius chiefly attended to wounds, and that diseases were attributed to the anger of the Gods, adds, " verique simile est inter non multa auxilia adversæ valetudinis, plerumque tam eneam bonam contigisse ob bonos mores, quos neque desidia, neque luxuria vitiarant."

But the difficulties which impede the curative operations of Nature are not fully appreciated when we limit our views to the

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* It is a law of Nature that the particles of water do not resist the application of a certain degree of heat; but that, at a definite temperature, they separate, they no longer exist in the form of water, but are converted into steam. At the level of the sea, the temperature required for this (to make water boil, as we call it) is 212 degrees of Farenheit's thermometer; but, on the top of a mountain, or in the receiver of an air-pump, partially deprived of air, they separate at a much lower temperature. Now the phenomena, as regards the quantity of heat, are very different; but, as regards the water, the law is the same, the degree of heat required being regulated by the pressure of the atmosphere in the two cases. This is an illustration used by Mr. Combe (Constitution of Man); and I take this opportunity of remarking, that there is great similarity in the mode of argument sometimes adopted in these lectures, although I had not read Mr. Combe's interesting work till long after they were written.

action of particular, as contradistinguished from truly natural, causes, which immediately excite diseased action, or produce injury. We must also remember, that, when diseases become manifest, or local injuries call for repair, the body has often been a long time previously disordered by influences not less injurious, although, by reason of the compensating powers of which I have recently spoken, they are less cognizable; so that the powers of life are not merely disturbed by the influences to which the art of man has subjected them; but these forces, whatever may be their nature, are acting, at the period when disease becomes cognizable to us, on vital powers previously impaired.

It is impossible to bestow any reflection on this subject, and not to perceive that death takes place, sometimes by a separate, and sometimes by a combined, operation of these influences. That is to say, that death sometimes takes place from the direct influence of a disturbing power; as in severe mechanical injuries, wounds of organs essential to vitality, poisons, and the like; at others, from causes in themselves not necessarily fatal, but which derive their fatality from the previously impaired machine on which they act. This happens, in a greater or less degree, in every epidemic; in small-pox, in measles; and, still more strikingly, in scratches and trivial wounds, which sometimes produce erysipelas and death; although, ordinarily, and on many previous occasions, in the very same individuals, the same injuries have happened repeatedly, without any ill consequence whatever.

If the preceding views be correct, it necessarily follows, that, in the treatment of diseases, it will become a very important enquiry: what are those disordering influences which have occasioned any departure from the natural condition of the patient, previously to the disease which we are about to treat? This enquiry will embrace his mode of living not only at present, but at former periods; the manner in which he may have been influenced by climate, &c.; his temper, disposition; and sometimes even the constitutional peculiarities of his parents. In this way, we shall obtain some notion of the various disturbing influences to which he has been exposed; and in some measure, also, of the impairment which they have produced on the vital powers, by ascertaining the kind of organization on which they have acted. In the absence of phenomena, demonstrative of the fact, these enquiries will also enable us to judge, with considerable accuracy, of the condition of the viscera, as having undergone organic alterations, or otherwise.

Now, all these enquiries are forced upon the physician; or, at least, are obviously suggested by the very nature of the maladies for which he is consulted: but I am more particularly addressing surgeons. The error consequent on the local disease, diverting the mind from the enquiry to which I have alluded, or very much circumscribing the limits of such enquiry, is so common, that I am very anxious so to impress on you the utility of the above mode of investigation, that no authority shall induce you to neglect it, or underrate its necessity. There is no good treatment which has not reference to it; and, even when the enquiry is not made, you will find that the surgeon has certain impressions which shew that he presumes, without enquiry, on what is, or what is not, the general force of the patient; that he, in fact, acknowledges the importance of the enquiry without having the industry to make it. I need not say that science can never be extended by such a cultivation of it. There is no local disease which is not capable of affording instruction of the highest utility when properly considered: but I cannot enter into all the processes of life now, without indefinitely postponing the practical matter with which they will be connected, and by which I hope to impress them on your memories.

If civilization, by increasing the number of disordering influences, has invaded the powers of Nature, it cannot be denied that it has also furnished some assistances; which, imperfect though they may be, are yet in some measure to be regarded as compensations. These, as a whole, constitute the practical application of medical science. But, as it may be inferred from the foregoing, that the necessity for medical interference (accidents always excepted) arises from a diminution or a disturbance of the vital powers, itself the result of factitious causes,—so it necesarily follows that the application of the science will mainly consist in measures calculated to place the œconomy in a natural condition, not only as regards factitious causes of disturbance generally, but especially those which have influenced particular disorders. In effecting the object just alluded to, our attention will be chiefly directed to those portals of the body which are most exposed to injurious agencies, or through which they most readily obtain admittance. All other things being equal, with regard to one or both of these conditions, our vigilance will next be directed to those parts which may possess, in a special manner, a power of

disordering the animal œconomy. It is in this way that the air we breathe, and the food we swallow, become objects of such paramount importance in the treatment of all maladies. The phenomena of life, as unfolded to us in disease, shew clearly enough that the derangement of any part of the body is capable of disturbing the whole machine; but they also force on us the conviction, that the general disturbance is excited more frequently by some parts than by others. If, however, their power of disturbing the system, abstractedly, were equal, still those which were most accessible to injurious impressions, or, at all events, most acted on by them, would practically become the chief objects of our care. Whether an organ derives its power of deranging the whole animal economy from a greater influence, or by an equal influence more frequently brought into action, creates, practically, no distinction.

I have thus endeavoured to connect, with the consideration of life, the necessity of the observance of its phenomena, and also to enunciate some of the fundamental principles on which your enquiry should be conducted in their relation to diseases: to this enquiry I shall presently return; but I will conclude this Discourse, the chief object of which is to impress on you a clear perception of the following propositions:

1. The life of all things is, in a *practical* sense, to be regarded as the law under which they live, to whatever kingdom of the creation they may belong.

2. That an enquiry into the nature of that *principle*, whence such laws *emanate*, can do little more than disabuse the mind from the influence of untenable hypotheses.

3. That if we continue our enquiry, we can only hope for information from the study of phenomena; and this, whilst it is promising in a speculative point of view, is the thing essential to professional purposes.

4. That these phenomena should embrace those which attend health, as well as those which characterize disease; and that there is no one source whence we may hope to derive more advantage in the treatment of disease, than from the investigation of that practical physiology, by which Nature shews the possible coexistence of health and comfort, with the functional derangement of important organs.

5. That the investigation of life will embrace all causes of

disease, whether natural or factitious; and their effects, not only in the organ on which they appear primarily to act, but on all others which may have become secondarily affected; and that the cure of diseases will depend on the removal of the disturbing influences, the surgeon being the negative, Nature the positive, agent in all.

Lastly, I wish you to understand, that this kind of enquiry, whilst it will in time reduce operative surgery within narrow limits, will, so long as operations remain necessary, more directly influence our success in them than any other mode of investigation whatever. Now, in furtherance of this enquiry, it will be necessary that I should consider the actions of life as unfolded to us in the phenomena of what are called the sympathies of the body,—and I may add, of the mind too;—but this will be the subject of the next Discourse.

DISCOURSE III.

ON THE SYMPATHIES OF THE BODY.

THE consideration of the living body is the object to which all our previous studies lead, and to which they are subservient. The only superiority that an anatomist and physiologist, however accomplished, has over a person ignorant of those sciences, is the superior power which he brings with him to aid his perception of the phenomena presented in the living body; to assist his endeavours to range such phenomena under the laws of which they are exemplifications; and thus to advance his investigation of the causes which produce them. Hence it happens, that the observation of a living being is not only that mode of enquiry in which all medical investigations must, by reason of ignorance of any other mode, of necessity have commenced, but in which the most cultivated kind of study must terminate; it is really the Alpha and Omega of medical research. The various phenomena observable in the body, may be naturally ranged in two grand divisions:— first, those which demonstrate the effects of various influences on the whole œconomy, or on any part of it; and, secondly, those which demonstrate certain connections, correspondence, or consent of action between its different parts. The phenomena constituting the latter class, are those which I propose to consider under the term Sympathy.

As the phenomena of Sympathy are seen in all diseases, so they have, of course, been observed at all times; and of this we find many interesting examples in the writings of Hippocrates. Indeed, you cannot peruse any medical work without finding exemplifications of them; nor can we say that the observation of them has not been applied to the treatment of disease, since some of the most ancient remedies owe their efficacy to the sympathy between different parts of the body: but that sedulous attention to the phenomena of sympathy, which can alone render them fully available, as helps to investigation of disease, has only been begun

in modern times; so that our knowledge in regard to them, may be said to be in its infancy.

Mr. Hunter, whom nothing important seems wholly to have escaped, was probably more strongly impressed with the importance of what might be deduced from the consideration of the sympathies, than any other author: though Dr. Whytt has shewn that he was well aware of their importance. Subsequent writers, and particularly Dr. Wilson of Kelso, have made some useful applications of the phenomena of what he calls morbid sympathies, in the treatment of fever, rheumatism, gout, and other important affections. Dr. Wilson Phillip has also ably evinced his perception of the practical influence of sympathetic phenomena.

Mr. Abernethy, however, deeply impressed with the enlarged and scientific views of Mr. Hunter, made the greatest step, in a practical sense, in the application of the sympathies of the body; for his "Constitutional Origin of Local Diseases" was a beautiful and clear deduction from the "sympathy of the whole body with all its parts," as taught by Mr. Hunter. But we are hitherto far from having arrived at the full application of the phenomena of sympathy. Important as the use made of them by the gentlemen above mentioned may be, they are still susceptible of one much greater; and there appears to be little doubt that we shall see, at no distant period, in what a prophetic spirit Mr. Hunter wrote, when he suggested that they might be made to contribute more to our knowledge of the treatment of disease, than any other subject whatever.

I endeavoured to give a little impetus to this investigation in my "Remarks on the Unity of the Body," as deducible from its sympathies, and as applicable to the extension of the constitutional treatment of local disease; and I shall here endeavour to enlarge on some points which were not so much insisted on in the work in question. Much certainly remains to be done, both in extending the application of the phenomena of sympathy to the treatment of diseases, in a manner not alluded to by the authors I have mentioned; and also in shewing how, and to what extent, they explain the importance of certain organs, particularly insisted on by Mr. Abernethy. In order to this, we must not content ourselves with merely looking to physiology, as arising out of anatomical investigations, for information respecting these phenomena*; we should

* See Dr. Whytt's Works.

rather enquire whether they be not more calculated to reflect some light on physiology.

In fact, the phenomena of sympathy are practical examples of function, and their study is a practical physiology. No subject is more important than this; and, inasmuch as no disease fails to present some illustrations of it, it is one, the whole of which it would be impossible to place before you in a general or elementary view. Hence it is the more necessary, that such a view as is practicable, should be clear, simple, and limited to facts and conclusions, which are, as much as possible, obvious and undeniable. If, therefore, notwithstanding that I restrict myself, for the most part, to such considerations, I should, in endeavouring to improve this path of investigation, express opinions, which though, as I trust, well supported, may not be obvious or unavoidable deductions from facts, I can only entreat you to accept them as such, and to consider, and test their truth, before you adopt or reject them.

Now, to make any arrangement of the subject is very difficult, because our knowledge of it is incomplete; and therefore, in the one I propose to adopt, there is, you will recollect, no other object than that of throwing the matter so far into some sort of order, as to facilitate your remembrance of the facts, and your subsequent application of them. I will at once tell you the plan proposed. Having defined what I mean by sympathy, I shall commence with the consideration of the skin; taking up next the mouth and fauces, I arrive at the bag into which the windpipe and œsophagus open in common. I shall then proceed with the œsophagus, stomach, and digestive organs,—those, in fact, which make the blood;—then with those which distribute it; and, afterwards, to such parts to which it is distributed, as have not been included in the foregoing arrangement; reserving for the last, the brain and spinal marrow.

But neither in the phenomena, nor in their application, do I profess to give you more than the ground-work of the subject: the superstructure will only appear when we arrive at the consideration of individual diseases, the nature of which it will help you to understand.

In order to convey to you what is intended by the actions of sympathy, as distinguished from ordinary, and, as is usually thought, more intelligible nervous action, I would put the following case. When I press on the ulnar nerve, where it passes

between the point of the elbow (the olecranon) and the bony projection on the inner side of it (the inner condyle of the humerus), I feel a sensation in the little finger and the one next it, very similar to that given by a slight shock of electricity. This is the sensation familiarly known under the term of "striking the funny bone." Now we explain this by saying, that usually the impressions on nerves are referred to their extremities; and as the ulnar nerve, the nerve in question, goes down the arm and supplies the two fingers which I have mentioned, so we say, that the impression produced by that pressure at the elbow is referred to the distribution of the branches in the fingers. Now I beg you to remark one thing here, which is, that it is, after all, the connection of the nerve with the brain, which enables me to recognize the sensation in the fingers; because, if the communication be cut off, that is, if the nerve be divided, then such sensations referred to its extremities do not take place: wherefore it is clear, that as there has been an impression conveyed from the elbow to the finger, producing action there, so is there a communication from the finger to the brain, giving me a recognition of it. Some entertain an idea that it is difficult to reconcile this communication with the fact, that when a man loses his foot,—for example, by amputation, —he will complain of sensations in the foot which has been thus removed from his body: and Mr. Hunter seems to have felt a difficulty of this kind when he referred it to the effect of habit in the brain. Now it appears to me, that a little quiet consideration of the laws and phenomena of the nervous system satisfactorily explains the difficulty, whilst it renders the phenomena in question a very striking exemplification of the law which explains it. The law may be thus stated;—all true, as contradistinguished from illusory, sensation, requires, as conditions, the coexistence of two things, which may exist singly, and which may be called impression and sensation. Impression may exist without sensation, and sensation without impression. In the former case no idea is conveyed to the sensorium; in the latter, the impression is illusory: and now for the illustrations,—and first for those most in point,—that is, when, as in the case of the man's foot, sensation takes place without impression, since it must be admitted, that the foot having been amputated, no impression could have been made on the nerves of it, occasioning the sensation referred to the toes.

When I see Mr. A or Mr. B, my particular friends, it is true that their images are depicted on the retina of my eye, and that a

sensation takes place in my brain, recognizing such impression on my retina: but how do I see these gentlemen in a dream, when perhaps they are miles distant from me, and when, therefore, there can exist no image of them on my retina, yet the sensation in my brain is as vivid as in the former case? There is, in fact, only this difference—that it is illusory. It may give rise to various feelings, like the true sensation, and may be apparently as really connected with all the other feelings of the dream,—joy, for instance, or sorrow, or surprize,—as when real. It is, in fact, sensation without impression.

The contrary may happen. I may be asleep with my eye-lids open; or I may be in a state of torpor, from disease. The same friends may now stand before me, and their images may be now really depicted on my retina: yet I see them not. In neither case does the brain recognize the impression, which here exists without sensation, the union of the two being the essential thing to true perception. But, as regards the eye, a still more striking instance is shewn on occasions equally familiar. I am walking in the street, and my mind is entirely engaged in thinking over some matter of interest.

I perhaps meet a familiar acquaintance; my face is directed towards him; yet I do not see him, though I am awake, and my mind active at the time. Every one must have met with examples of this occurrence in their own persons.

Now, here again, there can be no doubt that the image is depicted on the retina; but the mind, being occupied, does not recognize such impression; and a man stops you with "I thought you were going to cut me," or some such expression. But numerous illustrations may be drawn from other sources. The necessity of both impression and action to true sensation is shewn in what we call paying attention to impressions. If my mind be otherwise occupied, a conversation, which perhaps would be interesting enough, may take place without my hearing it, although it is certain that the oscillations of the air are the same as if I did. My attention being roused, and the conversation continuing, I now hear it distinctly, and my brain receives impressions of which before it took no cognizance. This necessity of impression and action, to correct sensation, is often of great service. If all impressions necessarily produced actions, I could not think in the streets, with my brain occupied by various noises; still less could I trust my ear to discriminate one sound amongst a number of

others, the actual impression of the sound sought being, as it often happens, less than those from which it is to be discriminated. Neither could I, on many other occasions, prevent a thousand sources of diversion of the mind, by surrounding objects, from that which it is desirous of particularly considering. The very use of the eye would be half destroyed if I had not the power of directing sensation to whatever class of impressions on the retina I chose. Vision would be nothing but confusion.

If, in regard to the ear and nose, impression always produced sensation, how should we ever feel quiet in the noise of a city, or become so indifferent as we do to unpleasant odours? We know that, if we sleep in a noisy room, at first our rest is disturbed; but we often become, in a night or two, indifferent to the impression. This is remarkable on board ship, where the guns do not awake people. Then the various odours of shops, such as druggist's, or some where the impressions are really offensive, how soon they are lost to those accustomed to them. We have all experienced this in the dissecting room; yet we have at all times the power of recognizing the odour, if we really endeavour to do so.

Then, how often people have heard noises when there really have been none to hear. The sense of touch presents examples of the same kind, being affected, in many persons, by sensations which they have compared to those resulting from all kinds of physical impressions, when no such impressions have been addressed to the organ. Whilst, therefore, sensation may exist without impression and impression without sensation, all experience proves, that correct perception depends on both in conjunction; and to argue that, on ordinary occasions, there is no communication between the impression on the nerve in my hand, and the brain which enables me to recognize it, would be, to explain the nature of those sensations which give us a real knowledge of surrounding objects by those which we know to be illusory.

Tortoises move after decapitation; many other animals run, too, and pigeons have flown after the same operation; all this being an exemplification of the action of muscles of ordinary volition; but in what respect do these phenomena of a few seconds resemble the sustained exercise of volition? Would any one argue that the muscles are not voluntary, because decapitation, and other less violent impressions, such as the actions of disease, either abrogate their power, or produce phenomena not observable during the natural exercise of their functions? The truth is, that these phe-

nomena have none of the natural characters of volition, any more than the contraction of a member removed from the body has. They are as abortive in their character as the sensations I have already referred to as illusory.

I believe it was Redi who entertained the idea that every part has, as it were, two brains, one at the cerebral end of the nerves, the other at their termination in the several parts, and that the function of the nerve was the communication of sensation between them. This has been conceived; and, whether it be the truth or not, it seems certain that the functions of the cerebral and distal extremities of nerves, and the filament connecting them, are each peculiar, although contributing to a general result.

To return to the case of sensation in the finger, resulting from an impression on the ulnar nerve—I may observe that it is an example of the reflex action mentioned by Mr. Hunter, as exemplified in the polypus, illustrated also by Dr. Whytt, in his experiments on frogs, and more recently dwelt on by Dr. Marshall Hall. Inasmuch as it is seen every day in the living body, it required no experiments on animals for the establishment of its existence. The expression, "reflex action of nerve," is, in itself, a confined one; for, as in the case which I have mentioned, it seems merely to imply that sensation may travel either from the brain to the organ, or from the organ to the brain. The facts of sympathy, however, shew that it may travel from any one organ to any other organ of the body; nor is it material whether it goes by way of the brain or medulla spinalis. The fact I wish to impress is, that there *is* a communication.

It will be seen that the practical application which I have already made of the doctrine of sympathy, in my "Remarks on the Unity of the Body," contains abundant exemplifications of this action of nerve without regard to its direction.

I dip my finger into warm water, we will say of the temperature of 96°; I feel it warm and comfortable; I am not sensible of any other phenomena; I have no evidence that my brain is the organ by means of which I feel the temperature: I only know this from what is above stated; namely, that, if the nerve be divided, that is, if the communication with the brain be cut off, I have not the sensation: but, suppose I now dip the same finger into very hot water; then, indeed, the phenomena are very different: I have a sense of heat and of pain; but I persevere, and keep my finger in the water for a few seconds; I now feel that there is general ex-

citement of the system; the mind itself is disturbed; I could not compel it to pursue its operations; and my heart increases both in the number and frequency of its pulsations. Here the heat applied to a distant part has disturbed my heart's actions; but I find no such direct connection between them as that between the ulnar nerve and the little finger.

There is the general connection of all the nerves with certain centres and with each other; and thus the nerves of the heart and finger may be said to be connected; but there is nothing more. Sympathies are, doubtless, communicated by the nerves; and all the nerves are connected with all parts by their communications with the brain and spinal marrow, and with each other; so that the *general* connection of all parts by sympathy, may be explained by the *general* connection of all parts by nerves. But, if we endeavour to explain *particular* sympathies by a reference to their particular connections by nerves, we find that anatomy affords us but little help; for we find very quick and rapid sympathy both with and without any direct nervous communication. Dr. Whytt, however, has dwelt sufficiently on this subject; and, as it is not material to my present object, I will not enlarge on it.

In the instance above quoted, we content ourselves with the simple expression of a fact, by saying that the parts sympathize. The word "sympathy," however, must not be understood as necessarily involving the notion of pain or suffering; since many of the most important examples of sympathy are attended by no suffering at all. You are to extend its signification to the words connection, correspondence, or consent, between any two or more parts of the system. You will understand, then, that the primary object is to make a simple catalogue of plain, demonstrable, and undisputed facts. If all parts can sympathize with all parts, it is immaterial from what point we commence our consideration. We will begin with the skin.

SKIN.

The skin may be considered as *one* of the portals through which external impressions affect the body; the consequent affections of various parts constituting so many examples of its sympathies. The large surface of the organ gives it a still further interest in connection with sympathy; since it not only sympathizes

with other organs, but its different parts sympathize with the whole surface. Hence impressions applied to a comparatively small portion of it may affect many other parts of the body; which, were the impression confined to the part to which it is applied, would not so frequently happen. This sympathy, then, between the skin and its several parts may be first illustrated. A blast of cold air blowing on a small district of the skin will frequently produce cold and shivering of the whole surface: and two things are here very remarkable; namely, that the affection of the whole organ is more readily produced if the blast of air impinge on a small surface than on a large one, and if it be applied to the posterior part of the body rather than the anterior. Cold, applied to the feet, and still more frequently if combined with moisture, will produce chilliness of the skin generally. These phenomena are familiar in "catching cold," as it is termed. Warmth, also, will frequently be diffused over the whole organ by communicating this impression to a part of it; and, although this is perhaps most remarkable in relation to the feet, yet it is by no means always essential that warmth should be applied there. The addition of clothing to other parts of the body will diffuse warmth over the whole; as we find in many persons who change the body clothing at different seasons, but who wear the same on their feet both in winter and summer. Irritating substances, applied to limited districts of the skin, often produce irritation over the whole organ: this happens in many persons to whom flannel or woollen garments prove irritating. The garment may be a flannel waistcoat or worsted stocking; yet the irritation produced by either, in many cases, becomes general. The eruption produced by tartar-emetic ointment is by no means necessarily confined to the surface to which it is applied; that substance sometimes producing pustules in very distant situations, and the eruption, in other instances, extending widely beyond the space over which the ointment was rubbed, and giving rise to very severe irritation. I recollect once putting a small plaster of tartar-emetic ointment to the perinæum, about one inch and a half in length, and perhaps three fourths of an inch in breadth. The patient was not in good condition at the time; and I shall not readily forget the severe irritation it produced. Pustules arose over a very large district, extending up the clefts between the thighs, downwards and laterally, towards the anus and buttocks, and followed by superficial ulcerations, which were exquisitely tender, extremely painful, and difficult to heal. In fact, the irritation and disturb-

ance were so great as to confine him to his room for more than a fortnight.

Blisters will occasionally produce shivering. Burns are well known to give rise occasionally to the same sensation; and troublesome boils after blisters are of familiar occurrence. These, too, are often very remote from the situation of the blister. Mr. Hunter mentions the popular remedy of putting a cold key down the back for bleeding at the nose; and it is well known that this application produces a sensation of cold, generally, over the surface. We all know the refreshing influence of a cool breeze on the face when we are oppressed by heat. A similar effect is produced by putting on a pair of cool shoes, after walking, in hot weather. Now, the sympathy, of which these facts are examples, you will find, by and by, to be very important, and chiefly in consequence of the extensive sympathies of the skin with other parts, which we will next consider.

It should, however, be premised, that impressions on certain districts of the skin often act sympathetically on organs without any *intervening* affection of the *whole* surface: on these I shall remark presently.

Impressions on the skin, then, will affect the HEAD. Cold will produce torpor of the brain, or even apoplexy, deafness, affections of sight, abrogations of taste and smell, and headache.

Cold, applied to the skin, will also produce inflammation of the throat and fauces: it will affect the stomach by feelings of sickness and oppression in that organ; or, in other cases, the BOWELS, by costiveness or purging, and sometimes by the production of inflammation. The reciprocity* of these sympathies is also well

* Sympathy is not always equally *remarkable*, in a reciprocal sense, as Mr. Hunter has observed; but we must be guarded in our conclusions on this point. There are really no two parts between which the sympathy is not reciprocal, although various circumstances interfere with the mode and degree of its demonstration. In the example quoted by Mr. Hunter, and which is so familiar to surgeons, the sympathy manifested by the stomach is nausea or sickness; so that it is a glaring one, and not to be overlooked: but the stomach often sympathizes very unequivocally with other organs, though without any such prominent manifestations. So the testis may sympathize with the stomach; and that it does so is clearly enough demonstrated by Mr. Hunter himself, when he speaks of excitement in that gland relieved by remedies addressed to the former organ. This observation of Mr. Hunter, however, is further interesting, as shewing that the possibility of influencing primarily affected organs by those secondarily affected had not escaped his notice altogether, although he does not appear to have prosecuted the enquiry—a principle hitherto by no means sufficiently considered, however abundant the

marked. Blows, or slight concussions of the head, produce paleness or rigors. Headache produces cold sensations on the skin. Various disagreeable impressions on the external senses—those of sight and taste, perhaps, most frequently—produce sensations of cold on the surface of the body, though individuals differ very much as to the external sense through which this is most readily excited. Almost every known disorder of the STOMACH affects the skin. The best examples (I mean the most familiar) are seen in the irregularity of its functions, in the alternations of heat and cold, in indigestion, and in the shivering which precedes, and the perspiration that either accompanies or follows, the act of vomiting. Our most powerful sudorifics, as antimony and ipecacuanha, effect their object by means of this sympathy. Certain states of stomach are attended by eruptions on the skin and sores about the mouth. Erythema is sometimes produced by eating muscles. Pain in the bowels will produce coldness or paleness, and rigors. Habitual costiveness also invariably has some effect on the skin. If the individual be otherwise well, this may be evinced by profuse or easily excitable perspiration; if the health suffer, by coldness of feet or skin generally, and partial circulation in the organ. Troublesome sores about the margin of the anus are frequent results from irritation in the bowels and other parts of the alimentary canal.

Cold, applied to the skin, will moreover affect the RESPIRATORY organs, causing inflammation of the lungs, and affections of the mucous membrane lining the TRACHEA, BRONCHI, and their ramifications, of the substance which connects these last parts, and of the membrane which covers the whole lung (the pleura). The caution we habitually employ in guarding the chest, especially in those who have a predisposition to disturbance in this part, are familiar recognitions of the connexion to which I am referring. Any depressing influence on the skin affects the action of the HEART. If

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empirical illustrations of it, and the extension of which it was my particular object to urge, in so much of the practical application of this subject as I ventured on in my "Remarks on the Unity of the Body." It is certainly in the highest degree interesting to contemplate the acute perception of John Hunter. Although I am by no means a servile follower of his, yet I cannot help seeing in his works much of the ground-work of almost every new suggestion of value. We have talked a great deal about him, it is true; yet much remains to be done before we can be said to do him justice. Mr. Owen, in the Lectures he is now giving, is likely, I think, to do much towards it. He proceeds in a very calm, philosophical spirit, and, with unusual advantages at his command, promises, I think, to give mankind a more true and just idea of Mr. Hunter than they have hitherto possessed.

the influence be sustained, as in exposure to cold, or severe, as shivering, in burns or lacerations, the action of the heart becomes depressed. If, on the contrary, the influence on the skin be temporary, it produces reaction in the heart, as if to restore the equilibrium.

So is the sympathy reciprocal, for all affections of the heart produce effects on the skin. If the heart act violently, whether in health or disease, the skin is evidently affected, generally by pouring forth its secretion; and, in some sudden disturbances of the heart, the almost instantaneous occurrence of profuse perspiration is very remarkable. Where violent actions of the heart are not productive of this effect, the skin feels hot and burning, as in fever. The sudden depression of the heart's action, by some of the passions, and especially by fear, is usually attended by paleness of the skin. Cold, applied to the skin, will, in some persons, change the functions of the liver; and excessive heat seems to have the same tendency, although, perhaps, in a different manner. Rheumatic affections, excited by cold, are very frequently attended by disorder of the liver; and the diseases of hot climates strikingly exemplify the effect of high temperature on the biliary functions. The well-known tendency of easterly and north-easterly winds to produce these affections in persons subject to them, is well known. Of the spleen, we know but little; but the striking phenomena seen in ague (the very leading features of which are the varying state of the skin presented in that complaint, and the curious affection of the spleen which, in many cases, accompanies it) leave no doubt but that there is a very active sympathy between the skin and the spleen.

Instances, shewing the reciprocal influence of the lungs on the skin, are very numerous and interesting. Any thing increasing their action tends to produce perspiration, as running, jumping, &c. The remarkable manner in which the skin sympathizes in disease with these organs is shewn in every affection of them; but perhaps in none more than in the relief occasioned by perspiration in asthma, and in the endeavours of the skin to relieve the lungs in the profuse perspirations accompanying phthisis. Indeed, we may be said to breathe partly by the skin, since, like the lungs, it throws off a quantity of carbon. No organ more certainly affects the skin than the LIVER. I speak not of the shivering that accompanies its organic diseases; but its functional disorder very certainly affects the skin. Many patients, labouring under

such disorder, complain of cold and chilliness; and I have known them complain of a sensation as if the lower extremities were immersed in cold water. The peculiar tint of the skin, in affections of the liver, may also be mentioned, though not perhaps falling necessarily under the term sympathy, as we are now applying it. With reference to the spleen, I have nothing to add at present: the remarks I have to offer respecting this viscus will occur in a separate section.

The sympathy between the skin and the KIDNEY is very remarkable; and in no one respect more than in that alternation of function which, during health, is known to characterize the two organs. When the skin exhales profusely, the kidney secretes but sparingly; but, in cold weather, or when we pass from a warm to a cold temperature, the kidney secretes much more abundantly; and in sudden changes of temperature, as from a warm to a cold atmosphere, with a quickness that is extremely remarkable. Many of the latter cases are, no doubt, examples of the sympathy between the skin and the bladder; which organ, again, by a kind of consent with the kidney, is more easily excited in cold than in warm temperatures. The effect so often produced by blisters* on the skin, occasioning strangury, is a familiar example of the sympathy between these parts. Impressions produced by cold on the skin are well known to affect the external urinary passage, greatly increasing the difficulty of the transmission of the urine, which again is facilitated by warmth. It is true that the contrary sometimes happens; but, of course, this is no less an evidence of correspondence between the parts in question.

The reciprocal sympathies of the kidney, bladder, and urethra, in all affections of these organs, produce very marked effects on the skin. The diseases of the kidney and bladder are, perhaps, more frequently attended by severe rigors and profuse perspirations than those of any other organ, the lungs only excepted. In many cases, where the affection is but slight, and confined to the urethra, they are still extremely remarkable. Both as regards their severity and their intermissions, they are frequently not distinguishable from such as occur in ague. Even passing a bougie, which shall produce no pain, will, as surgeons well know, not unfrequently pro-

* This is scarcely, perhaps, a safe illustration; as there is very good reason for supposing that it may be produced, in many cases, by absorption, and therefore explicable on grounds not meant to be included in the term sympathy.

duce a fit of ague. Irritation in this canal will also occasion ulcers on the skin in its vicinity—a circumstance which has formerly led to a vast deal of confusion and error. I have known a bougie produce a circle of sores in twenty-four hours; while, on the other hand, that ulcers are healed by the passing of instruments, combined with other judicious treatment, is now well known.

I have spoken already of the sympathy with the skin, shewn by the membrane covering the lungs (the pleura). The whole of the abdominal viscera receive, also, either a partial, but for the most part, a complete, investment from a membrane which we call the peritonæum. An affection of the skin, I mean the depression consequent on cold, has often excited inflammation of this part; and warm applications, either general, as the bath, or partial, as fomentations of the abdomen, are powerful *subsidiary* measures to its relief, however it may have arisen, whether from cold or any other cause.

Affections of the peritonæum, which produce also heat and excitement of the skin generally, and which, for the most part, have been preceded by sensations of an opposite character, also give rise to extreme tenderness of surface in many cases—I mean not of the peritonæum, but the skin. I do not here allude to that tenderness on pressure, in which the inflamed surface is influenced thereby, but to those perhaps less common instances, where the bed clothes, on the slightest touch, induce suffering.

The tenderness of the skin over parts affected, or even where no inflammation exists, is not peculiar to affections of the peritonæum. It occurs occasionally in those of the chest, liver, and other parts, though less remarkably. We know, also, that salutary impressions are conveyed in the same manner; as we see in the good effects resulting from local measures; such as bleeding, blistering, irritating applications, or frictions of the part.

The painful affection of the lower bowel, sometimes consequent on the application of cold and moisture to the part, as in sitting on damp grass, seems allied to this kind of sympathy. Impressions on the skin, besides the sympathetic disturbance of particular parts, will sometimes derange the whole animal economy; so that, instead of determining what function is wrong, we can find no one discharged rightly. This happens in various kinds and degrees of catarrh; and especially where followed by fever. The particular mode in which impressions on the skin have so enlarged and fatal a range in the production of the diseases of our variable climate, I

have endeavoured to explain, and, as I believe, correctly, in the work on Sympathy, published in 1835*.

The skin is affected by various states of mind; of which, fear, anger, and shame, in occasioning paleness or blushing, constitute the most familiar examples. Lastly, the condition of the skin is always reciprocally influenced by primary affections of the constitution. This is remarkably the case in animals where the importance of the skin is well known. A horse's condition is judged of greatly by this circumstance alone; and the influence of good grooming, which, in a medical sense, may be defined as consisting in cleanliness, with moderate excitement of the surface, is well known to have scarcely less effect on the condition of the animal than the food itself.

If we observe animals in a state of nature, their cleanliness and their condition are at once perceived by examination of the softness, pliancy, elasticity, and yet good fitting of their skin.

All animals are, by nature, cleanly. Some, to be sure, exhale offensive odours; but I know of no animal that becomes dirty, as our domesticated ones sometimes do, unless it be diseased. These, and similar circumstances observable in animals, have at all times impressed the few; but they have not much influenced the many. A friend of mine used to say, with more truth, perhaps, than good breeding, "Man, Sir, is the dirtiest animal I know."

It is certainly true, that the important relations of the skin have not been attended to in the manner they ought to be; nor the secretions of the organ, in different diseases, sufficiently observed. Neither is the habitual treatment of this organ calculated to keep it in a sound condition—a thing of great consequence in all climates, but which becomes especially so in those which are variable. Cleanliness is very much neglected; and condition, still more so; yet, if the skin be treated as common sense and the observation of other animals seem to suggest, it would be repaid by feelings of health and comfort. Every day, the whole skin should be cleaned, the exhalations of yesterday removed, and the surface excited by friction, as in wiping it with a rough towel. Of course, various precautions, as to the temperature of the air and water, will be necessary in different people; but with these, the effect will be good in all. That the skin should be diseased, or that organs should be affected by it so constantly in this climate, is not only

* On the Unity of the Body, &c.

not to be wondered at; but, when the habits of nine-tenths of the people are considered, for my own part, I am surprised at the skin being so healthy, and so little diseased as it is. How people exist, and with health, even under the various accumulations of secreted and excreted matters which we occasionally see, is certainly a problem, the solution of which is not easy; and, indeed, much more complicated than persons would imagine who have not considered it. The very curious products from the skin, of various colours, especially red and blue, and of odours of indescribable fœtor and variety, but still very characteristic, demand much fuller investigation than has been bestowed on them.

OF THE SYMPATHY BETWEEN THE SKIN AND SOME OTHER PARTS, AS MUSCLES, BONE, LIGAMENTS, FASCIÆ, ETC.

There is no point in connection with the skin which will not be, as well as other sympathetic phenomena, more particularly dwelt on in connection with particular subjects; but there are some remaining remarks which it is necessary to make in this place. Many of these parts are affected by what Mr. Hunter called contiguous sympathy, though this contiguity is not, as will be seen, an essential circumstance. Influences directed to the skin will affect the muscles. We see this in contiguous parts, when a stiff neck is occasioned by sitting in a draught of cold air; and we observe a more general effect, of a different kind, in shivering. The history of tetanus*, too, as modified by climate, and as influenced by applications to the skin, suggests another example of the sympathy between these parts. Tetanus has been cured by immersion in cold water, in hot countries, and by the application of snow in cold ones. The phenomena of rheumatism, as well as various other more fugitive pains in the bones and joints, from cold, are familiar illustrations, produced by influences on the skin; and this may be from a general effect on the whole surface, or of that covering a particular joint. In the latter case, it is often confined to the joint in question; and, although the influence on the skin may be general, yet the local affection may be confined to one articulation. In regard to those sheets of fibrous membrane which bind down the muscles (technically called fasciæ), I have mentioned, in my "Remarks on the Sympathies," &c. a very marked case of

* Locked jaw.

inflammation in the fascia of the thigh, in a boy, which was evidently excited by cold.

Now all primary affections of these parts produce also secondary effects on the skin. Various sensations of cold, even to shivering, are common attendants on sprains, contusions, or lacerations of any of the structures I have just mentioned. There are, in such cases, other sympathetic disturbances ; but I am now confining myself to the skin, as reciprocally influenced by bones, ligaments, joints, &c. In relation to the sympathy which exists between the skin, and parts which appear to be further implicated, through the skin which covers them, some few additional circumstances may be mentioned. The viscera of the chest and abdomen, and their membranous investments, are frequently excited into diseased actions by influences applied to the skin *covering* them. A very good illustration of this is seen in the cases mentioned by Mr. Pott. Injuries of the scalp, producing inflammation of that part, have been very frequently followed by serious inflammation and suppuration of the membranes of the brain. Mr. Pott's motto to his book is indeed literally true—"Nullum vulnus capitis contemnendum;" since very trivial injuries were frequently followed by such fatal results. The cases often promised to do well at the commencement; but, after a little time, pain, stupor, delirium, &c. used to come on. These cases appear to have been common in Mr. Pott's time; whereas they are now so rare, that I believe many persons of considerable experience have not seen them. I have seen two or three of them, but some years since. I believe the fact is, that wounds of the scalp are now better attended to; the patient is kept quiet; his bowels are regulated, &c.; and there is none of this sympathetic extension of disorder; for, unquestionably, when disordering influences act on a part, their sympathetic extension may be often either restricted or prevented by all means calculated to tranquillize the system. Disturbance of the cerebral circulation will, on the other hand, produce erysipelas of the head, affording a good example of this kind of sympathy from the brain to the skin.

DIGESTIVE ORGANS.

In tracing the surface of the skin to the interior of the body, the next set of organs whose sympathies are to be illustrated, in

conformity with the plan proposed, will be those engaged in the preparation and digestion of the food; and, if we take these in their enlarged sense, they will embrace the teeth, salivary glands, œsophagus, and alimentary canal, with certain other viscera; namely, the pancreas, liver, and spleen. With regard to the TEETH, much perhaps cannot be said; yet their sympathies deserve some notice. People are apt to consider the teeth as extraneous bodies, because they cannot demonstrate their organization, and because they know not how to arrange the kind of vitality with which they are endowed, with certain *preconceived* notions respecting the necessary characters of living parts. The phenomena of sympathy, however, here, as in many other instances, shew clearly enough that which the eye cannot discover. The disorders of children during the development of these organs need only be mentioned, with a view of impressing this important and indisputable fact, that they are, in the majority of cases, controllable, and, in some, removeable altogether, by attention to the general system*.

As children are often allowed to suffer very unnecessarily under dentition, I shall relate a case of this kind. A child, who had first of all a bilious attack, and, subsequently, fits on the appearance of every tooth, had been treated by leeches and calomel, on each occasion, with apparent relief, but without prevention of the recurrence of the disease. I told the mother that dentition generally produced irritation of the system, but that it was, like other sympathetic phenomena, very much aggravated, in almost every case, by the state of the general health; and that, therefore, if great attention were paid to this, the fits would certainly, in my opinion, be mitigated; that anything like a renewal of salivation would be unnecessary; and that, possibly, they might not even return. I found, on enquiry, that the mother was admonished of the approach of the fits and cerebral disturbance, by the appearance of yellowness of skin and disorder of the biliary secretion. As the child had already taken mercury several times, in salivating doses, I was anxious to avoid the use of this mineral. I therefore directed a plan, which had for its ordinary objects the substitution of a very plain diet, and occasional aperients of rhubarb and ginger, to ensure secretions from the bowels. I further directed, that, on the occurrence of the premonitory symptoms, doses of this

* It would be a subject well worthy of enquiry, whether animals in a state of nature suffered, and, if so, to what extent, in teething.

powder, with the addition of a few grains of jalap, should be administered every three hours, until copious evacuations should have been produced. As the lady described the child to be now in the state usually succeeded by the fits, and as the child had a very yellow aspect, I ordered them to begin at once with the more active powder. This was therefore done, and it was very gratifying to see the result. The fact was, that the child had no recurrence of the fits or cerebral congestion, although the treatment had been begun thus late, as it were. The action of the purgative produced biliary secretions; as, under favourable circumstances, many aperients will do, which do not appear to act on the liver otherwise than sympathetically through the bowels—a very important fact *in many cases*. I have mentioned this case especially, because the fits had been attended with cerebral disturbance; for which leeches and mercury, with a view to affect the system, had been given on two, if not three, previous occasions. This is now two or three years since, and the further progress of dentition has not been accompanied by any recurrence of the symptoms.

The occurrence of toothache from cold, independent of any decay of teeth, is well known; and it is also certain, that peculiar states of constitution predispose to toothache, also independent of any disease of these organs; the most common example of which is, the toothache of pregnancy. Then toothache, when occurring from causes more local, such as decay, will exceedingly disturb the general system, as almost every one must have either felt or witnessed. They evince, also, very marked sympathies with the condition of the stomach; but there is something in this which is very obscure. Usually, a foul state of stomach is accompanied by fœtor of the breath, sordes, and early decay of the teeth; but there are exceptions to this, though the general connection is remarkable. The teeth also frequently become sources of irritation to the surrounding parts, producing irritation of the gums, abscess, morbid growths, and sometimes even diseases of the bones, or antrum. Mr. Stanley, in his Lectures on Diseases of Bone, lately delivered at the College, shewed two or three specimens of disease, which appeared to have resulted from *misplacement* of teeth. The gums are parts of low vitality, but of high vascularity. They sympathize with various states of system; the most familiarly known examples are, perhaps, the state seen in scurvy, and that arising from the abuse of mercury. Various other conditions of system are, however, attended by unhealthy

states of the gums; nor is that peculiar condition of them, nor the fœtor accompanied by it, which is generally caused by mercury, *peculiar* to that mineral, of which more hereafter. I have seen, also, a much increased growth of gum, (which is more or less so common), in very direct connection with derangement of the general health. The most remarkable example I ever saw, was in a girl about twelve or thirteen years of age, whom I visited in consultation, in the country. Many of the teeth were so involved in the luxuriant growth of gum, that the points only were visible, and all had their crowns more or less covered. As usual, the gum was highly vascular, and much produced over the incisores. I only saw her once, and I recollect she took nitric acid and plain diet, with good effect: but I do not know the result of the case. A species of it is very common, and, in general, as one would perhaps rather expect, sympathetic with disorder of the alimentary canal. This state of gum is often accompanied by a high degree of vascularity of the mouth, tongue, lips, and nose.

SALIVARY GLANDS.

The salivary glands are parts as little subject to disease, as perhaps any in the body. Alterations of structure in them are comparatively rare; and it is from analogies of this kind, more distinctly observable in the parotid and submaxillary glands, that we infer the nature and functions of a gland that we have much less opportunity of observing—namely, the pancreas, or sweetbread. We see, however, on various occasions, that the salivary glands evince a very remarkable sympathy with certain states of the system. The affection of them, in common with other parts, by mercury, is well-known; and they frequently manifest a sympathetic recognition of any irritation about the mouth. This recognition is shewn in the manner most usual with these parts; that is, by an instantaneous increase of their secretions, much in the same manner as the lachrymal gland is affected by any irritation applied to the eye.

The sympathy of these glands with the stomach is very remarkable; for as soon as food is about to be introduced into that organ, and that preparation of it in the mouth, to which the salivary glands contribute, rendered necessary, they pour forth their

secretion in great abundance; and this may be observed in animals. Horses sometimes have the parotid duct wounded, so that it opens on the face, and it is curious to see the fluid shoot forth the moment anything is offered to the animal to eat. Those who have dogs much about them, must have often observed the abundant secretion that takes place from the mouth, whilst these interesting animals are watching for some little contribution from their master's meal. This is what has been called "making the mouth water." These sympathetic affections, however, are not always shewn merely by an increase of secretion. The congestion of the parotid gland, in the disease commonly called mumps, seems the result of certain atmospheric influences, acting on a susceptible condition of the constitution. The curious manner in which the testis is known to sympathize in many of these cases, is matter of common observation. Diseases more frequently occur in the neighbourhood, than in the substance, of the salivary glands. Abscesses and tumors are often seen to form in the vicinity of, and upon, the parotid gland*; and, in the former, the irritation of the gland is frequently evinced by a considerable increase of secretion: there is often a copious dribbling of saliva in such cases. The back part of the mouth and throat have well-marked sympathies with the skin, as already mentioned, indicated in the sore throat of common catarrh. Inflammation and irritation of these parts, also frequently arise from irritation in the stomach and other parts of the alimentary canal: the most marked and unmixed example of which is a kind of erysipelatous inflammation of the tonsils and throat†, attended with pain and difficult deglutition; but which does not usually go on to suppuration or ulceration. The other affections so common in these parts, as inflammation of the tonsils proceeding to suppuration, are more mixed cases, and usually accompanied by *demonstrable* disorder of the digestive organs, and some impression on the skin, appearing to occur in conjunction.

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* I have this day (May 16, 1837) seen a case of enlarged parotid, with increased salivation, in a child. In this there is apparently an absorbent gland, lying upon the parotid, also enlarged. There is likewise a man, with abscess over the parotid, now in the Dispensary, evidencing the same fact.

† On May 12, 1837, a man applied at the Dispensary, to the condition of whose throat I directed Mr. Leigh's attention, as a well-marked example of this kind. The man was ordered plain diet and aperients, and in four days the erysipelatous affection of the throat has disappeared.—May 16.

ALIMENTARY CANAL.

In the Alimentary Canal we arrive at another very important portal of the body; and one, the sympathies of which have an excitability and range of operation, more extensive, more constant, and more active in the direct and indirect causation and control of disease, than any other set of organs. It is easy to understand why channels most exposed to injurious influences should have the greatest aptitude to give alarm to the system; since the phenomena by which these alarms are exemplified, either afford means for the expulsion of noxious agents, or exclude their further ingress. Mr. Hunter seems to have thought the sympathies of the Stomach more extensive than those of any other organ; but this, perhaps, might be difficult of demonstration. That they are more exposed to injurious excitement is, I think, indisputable; and whether their more frequent manifestation result from this cause, from an increase of sympathetic influence, or from both in conjunction, it is perhaps, in a practical point of view, not very material to determine. The facts are indisputable, and the conclusions to which they lead, plain and simple deductions from such facts, to any one who will give a moderate attention to the subject. The circumstance of the stomach so usually evincing its sympathy by nausea or sickness, phenomena of a nature particularly obvious and striking, forms such a contrast with the unobtrusive manner in which many other parts evince theirs, that this is perhaps calculated to lead us to over-rate its comparative sympathetic excitability. There is no fear, indeed, that we can over-rate this property in the stomach; but an *exclusive* attention to it may sometimes narrow our views, and lead us to overlook other sympathies which are coexistent with it, and on which, in a given case, that of the stomach itself may depend. We might thus be often led to consider a chain of phenomena to result from a primary affection of the stomach, in which the disturbance of that organ might be a secondary, or even tertiary, link.

The sympathies of different parts of the alimentary canal with each other, may be first noted.

Indigestion will produce flatulent, purged, irritable, or costive conditions of the bowels: a very small particle of undigested matter will frequently disturb the whole canal; and this disturbance may wholly cease on its dejection from the lower bowel. In

children, this is very remarkable; but I have often seen it in the adult also. One of the most obstinate and threatening constipations that I ever witnessed, appeared to depend on a portion of undigested aliment; as the symptoms ceased on its discharge. Deranged conditions of the bowels will, on the other hand, when apparently primary, equally disturb the stomach; producing nausea, sensations of weight, and, in short, exactly the same symptoms as occur in the stomach when primarily affected.

The action of many purgative medicines, given by the stomach, seems to depend on the sympathy of the bowels with this organ. This, perhaps, is especially the case with those which combine portions of jalap, antimony, ipecacuanha, or croton oil; for nothing is more certain than that many aperient medicines induce action on the bowels before the substances themselves arrive at that part of the alimentary canal. For, in the first place, vomiting will be often followed by purging; although the medicine shall have been rejected. Then again, the action of all aperients is usually increased by any substances that produce a tendency to nausea, as antimony or ipecacuanha. I recollect a gentleman who was sharply purged by putting the cork from a bottle of croton oil to his tongue. Now we know that many substances have a peculiar influence on certain organs, let them be introduced how they may. Thus, ipecacuanha vomits; senna, and many other drugs, affect the bowels; savine and ergot the uterus, cantharides the bladder, and so on: but, that the action of the aperients I have first mentioned, when introduced into the stomach, is not to be explained safely in this way, may be inferred from the fact, that if they are introduced directly into the bowels, a much *larger* quantity is usually required than when they are given by the stomach. The greater efficacy of smaller doses, given by the latter organ, seems then to depend on some sympathetic relation between the stomach and bowels, by which certain actions of the former, no matter of what kind, lead to certain actions in the latter, as is the case in the natural performance of their respective functions. Now, if we turn our attention to the bowels, we shall find that anything which produces a tranquil condition of them, will tranquillize, in many cases, the stomach also; a very common example of which is often presented in the mere injection of warm water. When ipecacuanha, or opium, or any other substance which has marked effects on the stomach, is introduced into the bowels, it will, it is true, affect the stomach; but, in regard to articles by which the stomach seems to

have a *particular* disposition to be affected, so far from *larger* doses of them being necessary to produce the effect, when directed at once to the stomach, we find that much *smaller* ones only are necessary; which is the contrary to what we have observed in regard to the bowels, as affected by remedies introduced into the stomach; these appearing to derive increased force from the sympathy between the bowels and this organ.

I dwell a little on this sympathy from the stomach to the bowels, because I regard it as very important, in a manner to be hereafter more particularly applied. It opens to our view various means of affecting the bowels through the stomach, not only by employing aperients in a different manner, but by *rendering various medicines aperient which do not at all belong to this class of remedies.*

On the principle here hinted at, I have known the action of the lower bowels induced by infusion of bark; and, what is much to the purpose, an action so natural, as I never witnessed from any purgative whatever, or indeed to be distinguished in any way from natural action. Since, however, I shall have occasion especially to revert to this operation on the lower bowels, through their sympathies, I will not pursue the matter further just at present. Any obstruction of the bowels, inflammation of these parts, or hernia, either with or without it, will produce distressing sickness of stomach; nor am I acquainted with any affection of any portion of the alimentary canal which does not affect the whole. Of affections of the alimentary canal, arising from influences primarily directed to that part which we term the duodenum, we have not such direct evidence as we have in relation to other parts of the tube; but the sympathies of the liver and alimentary canal, besides many other less demonstrable conditions (in which, however, the functions of the duodenum seem much at fault), leave no reasonable doubt of the reciprocal sympathy of this part and the rest of the alimentary canal.

The sympathies between the alimentary canal and HEAD, are very remarkable. The headache, so frequently occasioned by disorder of the stomach or costive bowels, and sometimes also by a too relaxed condition of these parts, is well known; as are also noises in the ears, various affections of sight, as motes, flies, and other kinds of illusory vision, and nausea and other affections of the taste. I have known all that disorder of smell and taste which is so common in ordinary colds, proceed entirely from stomachic irritation. Blindness, from worms in the alimentary canal, is well

known to have frequently occurred in children; whilst convulsions and St. Vitus's dance, arising from alimentary irritation, shew how the muscular system may be affected by the same sources*. The determination of blood to the head, dependent on irritation of the stomach, and disorder of the bowels, whether occurring singly, or in conjunction, is perhaps one of the most frequent indirect causes of apoplexy: the sickness which so often accompanies it, is an evidence of this sympathy.

On the other hand, blows on the head, which produce cerebral disturbance, are very commonly followed by vomiting, as is well known. This sickness is, most likely, very salutary, and probably enables the organ to resume its function much sooner than it otherwise would.

I have met with two remarkable cases of concussion, in which the reaction, which almost invariably takes place when the patient revives, did not take place at all, and rendered the cases extremely puzzling, and productive of anxiety. Both patients recovered. Their detailed relation would occupy too much space here; besides, it is important that they should be mentioned hereafter, in teaching a difficult branch of surgery. I will here only state, that both patients received the injury with a full stomach; that there was no vomiting; that consciousness returned very slowly; and that the pulse kept at the range of from forty to fifty for two or three weeks, when the very cautious administration of very mild and nutritious food restored the system in each case safely to its equilibrium. I will next proceed to consider the sympathy between the alimentary canal and the viscera of the chest, and first of the HEART, which often sympathizes in a very remarkable manner with the alimentary canal.

I do not assert that all the sympathetic phenomena occur without the intervening sympathy of some other organ; but we must be content, in this place, with remarking simultaneous disturbance of the organs in question. When we take a meal, we always find the action of the heart affected; in health, the pulse is always stronger, and somewhat more frequent. In various disorders, the

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* Very recently I saw a case, in which the patient, a little girl, laboured under deep-seated pain in the eye, with defective vision, simulative of inflammatory disturbance of the retina; the coexistence of alimentary irritation, however, evinced by the dejection of worms, led me to restrict the treatment to measures calculated to correct this symptom; when the affection of the eye got well.

influence exerted on the heart by taking food is manifested in different modes, but always in a very unequivocal manner. We need only feel the pulse before and after eating, to be convinced of this sympathy. In disordered conditions, however, the pulse is rendered much more frequent, and much stronger than in health: sometimes it is more frequent without being stronger; and in cases where the nervous system is much depressed, or where the individual is much fatigued, the heart will not beat more frequently after a meal; but, on the contrary, a frequent, weak pulse, will be changed into one which is less frequent, but more strong and full.

Stimuli, such as wine, brandy, camphor, ammonia, and so on, when taken into the stomach, immediately increase the action of the heart: but here again the effect is not always the same; for sometimes they strengthen the pulse, and render it less frequent; but this is never the case in health, for then all stimuli taken into the stomach increase the action of the heart both in power and frequency.

Many substances, on the contrary, when taken into the stomach, depress the heart's action; as ipecacuanha, antimony, and narcotics, when given in moderately small doses; and we often successfully avail ourselves of the knowledge of this fact, in cases where the object is to diminish the heart's action, as happens in many diseases, especially in inflammation.

Sickness is always attended by sympathy of the heart; and, for the most part, by a very marked depression of its power; the pulse becoming much weaker, and usually much softer and more frequent. All this, though in ordinary cases less strikingly demonstrated, is equally true with regard to the bowels. Costiveness of these organs is often indicated by the pulse in a very remarkable manner. The most characteristic pulse I know of, as connected with this state, is a hard, retiring, somewhat small and frequent pulse. It certainly varies in most of its characters; but more or less hardness is scarcely ever absent. In inflammation of these organs the pulse is usually small and frequent previous to the adoption of treatment. But although the condition of the pulse is different in different cases, it is always more or less affected by costive bowels; and purging also is known to be attended by similar indications of sympathy, generally by increased frequency of the pulse, with diminution of power.

Serious injuries of the alimentary canal, as well as of all other vital organs, produce depression of the heart's action. Besides,

irritation in the alimentary canal will produce all kinds of irregularity in the function of the heart, the most marked instance of which is the occurrence of palpitation. Many persons have been thought to have disease of the heart from the frequency of palpitations; which, however, have ceased on restoring tranquillity to the alimentary canal. I have seen several cases of this kind; and shall only caution you against too hasty a conclusion—against the danger into which you will be apt to fall, of referring a real disease of the heart to mere sympathetic derangement. Now this is a serious error: for, although many of the measures which will remove palpitations dependent on alimentary irritation are equally applicable to diseases of the heart, yet this is not the case with all of them. That exercise, which is so universally good in the one case, is mischievous in the other; and the diet that would be good in some cases of disordered alimentary canal is prejudicial in affections of the heart. Besides, your overlooking the disease would certainly deprive the patient of the advantage of many other cautions, regarding general tranquillity of mind and body; moreover, your reputation would suffer. I mention this caution, because I have known a very distinguished individual commit the error in question. You will find, in the work of Dr. Wilson, of Kelso*, on "Morbid Sympathy," two cases of severe and dangerous affections of the heart, which were more relieved by attentions to the digestive organs than by any other means whatever: in the one case, by the discharge of disordered secretions from the bowels; and, in another, by the same means, combined with the evacuation of acrid matter from the stomach, consequent on the exhibition of emetics. In cases of any kind, where the functions of the heart are seriously disturbed, all its sympathies, and especially those with the mind and with the digestive organs, are of the first consequence to be remembered. Life is here held by so uncertain a tenure, that any cause of disturbance may destroy it; since the action of the heart cannot be suspended, in one case in a thousand, without life ceasing instantly. Now, if the alimentary canal or any other part produce sympathy in the heart, it must necessarily affect the LUNGS also; for the lungs will not act without the heart, nor the heart without the lungs, as will be observed when I speak of their sympathy with each other; but the stomach will

* Wilson, on Morbid Sympathy—Angina Pectoris.

affect the lungs in a manner which by no means renders it necessary that it should do so through the intervention of the heart.

Of all cases which evidence the sympathy between the alimentary canal and the lungs, asthma is, perhaps, the most familiar and striking; for, whatever may be the degree of tranquillity of which the case is susceptible, it is always best secured by a moderate and cautious diet, and attention to the functions of the bowels. In the distressing paroxysms of suffering, so common in this complaint, nothing appears so frequently a predisposing and (temperature excepted) exciting cause, also, as disorder of the alimentary canal; whilst, in different cases, emetics, aperients, or both, produce the most striking relief. Various coughs are proverbially known to arise from irritation in the stomach, as well as some severe forms of irritation, attended with copious secretion from the ramifications of the wind-pipe, in some cases closely resembling phthisis: but more of this when I speak of the liver.

Affections of the lungs, too, will reciprocally affect the stomach, producing irritability of that organ of a most distressing kind. I recollect a very interesting girl, who died of confirmed phthisis, whose stomach for a long time resolutely rejected almost everything offered it; so that, notwithstanding that very small portions of nutriment were retained from time to time, yet it seemed wonderful how she existed with so small a quantity of food. Dr. Wilson, of Kelso, mentions croup as arising from irritation in the alimentary canal; and, although I have not seen enough of the disease to enable me to speak confidently on the subject, yet I am strongly inclined to believe that, in the vast majority of cases of this serious affection, the predisposing cause is to be found in the alimentary canal. The well-known good effect of emetics, when given early in this disease, seems to favour the view here taken.

LIVER.

The alimentary canal is connected with several viscera, which, though we know not their functions perfectly, we have sufficient reason to believe are, in some degree, coadjutors to the general function of assimilation. Of these, the liver, of which I shall speak more fully by and by, is the most remarkable.

The disorder of the liver consequent on derangement of the

stomach—the almost constant sympathy which this organ evinces in every form of indigestion, sometimes by deficient, at others by redundant or morbid, secretion—is well known. Disorder of the stomach seems a very essential irritant in the generation of diseases of the liver so common in hot climates; and, when the liver has been once diseased, or when it retains any chronic form of disorder, no persons know better how soon it is excited into active disorder, by imprudence in diet, than those who labour under the malady. The sympathy, too, is very reciprocal; for the irritability of the liver, in this state, excites a salutary caution by the susceptibility which it reflects on the stomach; the latter organ frequently rejecting many substances which are of injurious influence on the liver, especially fatty, greasy, or oleaginous matters*. Irritable conditions of the liver are also greatly soothed by caution in diet; and, when disposed to active disturbance, by emetics. Most persons who are bilious, as it is termed, are well aware of this fact.

The necessity, as well as the difficulty of keeping the bowels regular, on account of the effect of costiveness on the liver, are well known; whilst the bowels, if not supplied by a due discharge of bile, become invariably disordered, and generally costive. Still, it is true, that various disorders of the bowels, which are either primary, or not distinguishably otherwise, affect the liver. Perhaps, however, an extended consideration of the subject may throw some doubt over the nature of many disorders of the bowels, which, at first sight, appear to be primary. Nevertheless, it is certain that many affections of the bowels, not necessarily arising from disorder of the liver, do very evidently reflect disorder on that viscus; so much so, that there is hardly any disease of the rectum, of which surgeons see so many cases, in which we do not find the liver evincing sympathetic disturbance.

As I shall have again to speak of the liver, I shall not enlarge farther upon it at present; and what I have to say of the spleen

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* I recollect a case of severe jaundice in a woman who was doing exceedingly well; but who, without any apparent cause, had, on two occasions, a sudden relapse of all her symptoms. She had been forbidden to eat animal food; and, on the second relapse, she enquired whether it was probable that a small piece of ham, actually not more than a moderate mouthful, could have been the occasion of the recurrence of her symptoms? On her being told, somewhat doubtingly, that very small portions of offensive matter did sometimes produce considerable disturbance in deranged conditions of the stomach, she said, "I think it must be so; for, on the first occasion, I had eaten precisely the same thing."

will form a separate section. Of the PANCREAS we know but little. It is, in structure, like the salivary glands; and, like them, but seldom found diseased. Like them, also, it secretes an aqueous fluid, which it pours into the alimentary canal in the same situation as that in which the liver transmits the bile. A few cases of disease, of a curious nature, have occurred in it, but without our being able to deduce any thing additional to the very little we know of its functions. An unusually firm condition of pancreas is not uncommon. I have seen many cases of it; but pathologists have not been accustomed to regard this as disease. The sympathy of the alimentary canal with the URINARY ORGANS, must next be mentioned.

The reciprocal sympathy between the urinary and genital and the alimentary organs is numerously and strikingly demonstrated in a vast variety of different diseases. A few examples may suffice to exemplify the connection. Various substances, taken into the stomach, very much increase, as every one knows, the secretion from the kidney. The accompanying phenomena are very interesting. Some matters seem to be separated by the kidney, as if they were injurious, very soon after having been taken into the stomach; as balsam of copaiba, and asparagus, the odorous principles of which are detected in the urine very shortly after they are swallowed. The same thing happens, also, in the case of various salts; but other substances produce a purer kind of sympathy, if I may so express it; that is, one not referable to the disposition in the kidney to separate particular substances, which may be rather referred to a sympathy between this organ and the general system, or the blood. For example, alcohol, various aromatics, as cubebs or cayenne pepper, colchicum, and many other things, taken into the stomach, produce a quick sympathetic recognition of them by the kidney; and it is very important to recollect, that the evidence is often of a different, and even of a contrary, nature. Thus, several substances which will, in one state of system, increase the secretion of the kidney, will, in another, diminish it*. The same diversity of effect is also produced by abstinence and rest, or extremely moderate diet. I mean that it may in one case diminish,

* Alkalies and acids will, at different times, and in different cases, increase and diminish the urinary secretions.

and in another increase, the secretion. That very intractable disease, Diabetes, is probably but an exemplification of the sympathy of the kidney with the digestive organs. We know little of this disease; but it may be that we have not enquired concerning it in the right manner. The kidney has been constantly examined with a view to some alteration of structure; but nothing available to the solution of the disease has been discovered. For my part, I should rather conclude that the kidney, instead of being diseased in diabetes, was perhaps one of the few organs that were sound; that it was, in fact, throwing off matters injurious to the system; and which were generated by the diseased actions of other organs. This is, I believe, the kind of view that is now pretty generally entertained*. We might, with just as much reason, in my view of the matter, look for disease of the skin in phthisis, because its secretions are sometimes so profuse, as for the cause of diabetes in the kidney. Organs which are diseased are not remarkable for the abundance of their secretions. The kidney also sympathizes very much with the bowels. If the bowels are costive, the urine is generally loaded; this seems to be healthy sympathy; but large quantities of pale urine are excreted by many nervous persons, with partial circulation, whose bowels are habitually costive. But, in costive bowels, you scarcely ever see the urine perfectly natural. All real affections of the kidney reciprocally affect the alimentary canal; but the stomach more remarkably, perhaps, than the bowels. To my mind, the superior excitability of the sympathy between the stomach and kidney, as compared with that between the bowels and kidney, is very beautiful. The stomach is, as I have observed, one of the portals of ingress to the body; the kidney, one of its outlets. No sooner does the stomach receive certain matters which are to be voided by the kidney, than sym-

* Drs. Rollo and D. Latham referred the disease to chylopoietic derangement. When we consider the relation in which the kidney stands to the animal economy, it is impossible to resist the suggestion, that its action in diabetes is a secondary process in the disease, to say nothing of the comparatively few cases in which any morbid condition of that viscus is found, except such as may be readily conceived to result from undue excitement of its excretory functions. Nevertheless, the kidney may, one would conceive, be primarily affected in certain cases; so that probably there may be cases in which the disease is really in the organ. The facts, however, strongly point to this as the exception, and to the sympathetic disorder as exhibitions of the rule. Whatever view we take of it, however, the thirst, voracious appetite, emaciation, dry skin, and, in some cases, disease of the bowels, all equally demonstrate the sympathy between the urinary and digestive organs.

pathy, like an electric messenger, communicates with the excreting organ*. Indeed, when we consider the sympathies of the portals of the body, we cannot but be struck with the subserviency they have to the safety of the individual. Now, as the kidney and the other urinary organs have close sympathies with each other, hence it follows that the bladder and urethra partake of any sympathy manifested by the kidney†. Further, the bladder and urethra reciprocally excite sympathy on the part of the kidney and stomach. Almost all affections of the bladder or the urethra produce increased flow of urine; but there are exceptions, some diseases seeming rather to diminish the secretion of the kidney in certain cases. Irritation in the bladder from stone, or disorder of its mucous surface, or irritation in the urethra, as from passing a bougie, will produce sickness; and the tranquil condition of the urinary organs, as promoted by a regular condition of bowels, is well known. The lower bowel or rectum has a particularly marked sympathy with the bladder and urethra; disease or irritation in either part almost invariably producing more or less in the other. This happens in many cases where stricture of the rectum, contractions of the urethra, piles, &c. are combined, rendering it extremely difficult, and often impossible to trace the order of their occurrence. I do not think it necessary to dwell longer on this sympathy, because it must be more fully discussed in connection with the important affections of the urinary organs; but I shall, in conclusion, remark, that the most torturing affections, with which humanity is visited, result from inattention to this sympathy. Gout, gravel, stone, disease in the kidney, the various excruciating affections of the bladder, and diseases of the urethra, are generally the result of inattention to circumstances which might be avoided: and the indulgent father, who pampers his child in food, may rely on it that he is often sowing the seeds of torture. If it be true that the stomach and

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* On the other hand, if there be stone, gravel, inflammation, or irritation in the kidney, sickness of stomach is invariably produced.

† In the irritable bladder, depending on irritation in the urethra, the sympathy between these organs and the stomach is often very remarkable. A patient shall, in the fore part of the day, be teazed by constant desire to pass water; whereas, after dinner, he shall be enabled to wait hours without being again called on. The contrary condition also is very common. The application of these facts is of the first consequence in many of the most teazing forms of this complaint, which readily yield when we avail ourselves of the hint thus afforded, as will be detailed in the proper place.

alimentary canal are made to digest and prepare the nutritious parts of food, and that the kidney, with its apparatus of bladder and urethra, is merely concerned in carrying off the rubbish, as it were,—and of these two facts there is no doubt,—it follows that if you put rubbish (that is, innutritious or noxious matter) into the alimentary canal, you in fact put it into the kidney. Surely any person with three grains of understanding will immediately perceive how disorders of the alimentary canal produce gout, stone, &c.; and how that education rather than repression of animal gratification, so daily seen in the management of children, must, by heightening such pleasures, and rendering them matters of habit, lay, as I have said, the seeds of these cruel disorders. In short, if we extend our view of the defects of education, as regards the animal propensities, what do we see? We behold the urinary organs placed between two deadly fires, kindled by their sympathies—the one, that coming from the kidney through its sympathies with organs most abused by habitual indulgence, the digestive organs; and the other, that coming on the side of the bladder, by causes operating in the urethra: and what is the consequence? That, where people do not die of diseases that cut life short before its time, there is not one in ten, perhaps, of those who reach nearer to the limit of human existence, but is either a sufferer from, or is finally carried off by, diseases of the urinary organs.

I could mention cases out of number relating to this sympathy; but it is, perhaps, unnecessary: your success in practice, however, will be materially influenced by your knowledge of this sympathy. I have had many patients from the first surgeons in England, who have failed in their treatment; and yet the very same treatment, as the patient has often said, has been successful. The patient looks to medical or manual measures; and these indeed have often, nay generally, been the same; but there has been superadded to them diet, adapted, as far as I was able to do it, to the particular accompanying disorder in each case; and it is almost always the alimentary canal, or some other viscus, with which it has a vivacious sympathy, that is thus affected; but the kind and degree are not the same, perhaps, in any two cases. The sympathy of the alimentary canal with the kidney has been already mentioned; but it is equally true as regards the bladder and urethra. The substances mentioned in connection with the above organ (the kidney) will produce sudden, and often disordered, actions in the bladder and urethra. Alcohol will, in many

persons, cause spasms of the urethra; and opium will, in many instances, as quickly relieve them; without, be it remarked, any affection of the whole system that is cognizable as the effect of opium. Neutral salts, alkalies, and acids, also produce effects on the bladder and urethra; but these are not so good examples, because they may be explained in another manner. I have known thirty drops of laudanum relieve the most distressing irritation in the urethra in five minutes; and I have known an injection of warm water into the rectum produce the same effect. The sympathy of the stomach and bladder has been remarked by Celsus. In connection with the removal of stone from the bladder, he says—"ut non ignoremus * * * * sæpe affici stomachum cui cum vesicâ quædam consortio est: exque eo fieri, ut neque retineatur cibus, neque si quis retentus est concoquatur, neque corpus alatur."

In connection with the urinary organs, I may add a remark or two with reference to the testis, as sympathetically affected by the digestive organs. Pain in the testis produces sickness; and, though it is seldom that we observe irritation in the stomach producing reciprocal affections of the testis, yet, as Mr. Hunter observed, an inflamed testis may be salutarily influenced by emetics. Besides this, there are, however, certain irritable conditions of these glands which are materially influenced by the state of the digestive organs; and the most severe case I ever saw was one in which a remarkable disease of the gland was contemporaneous with extreme and habitual disorder of stomach. The curious sympathy between the salivary glands (a part of the digestive system) and the testis, which also seems most active in the contrary direction, should be remarked.

Johannes Hunter dixit consortium inter testes et ventriculum reciprocum non esse. "Videmus" (inquit) "testem sæpe ventriculum, ventriculum raro testem afficere," quod ex hernia humorali illustrat. Nihilominus memorandum quod per multos alios casus hoc consortium etiam manifestum est. Quî fit, rogamus, ut consuetudo inter sexus famem fere moveat. Unde oritur ista debilitas non modo viscerum chylopoieticorum, sed totius etiam corporis quæ semper excessum veneris insequitur? Unde istud consortium fere omnium animaliùm commune, quod inter vim virilem, et functionum assimilantium potentiam, existere videmus? Quandoquidem igitur ventriculi consortium fere nauseâ vomituve indicatur, ita verisimile est, hoc consortii signum, observationem ab aliis signis, minus

equidem obtrusis, sed æque certis et valentibus ad morborum tam generationem, quam curationem detraxerit. Multæ affectiones partium genitalium chronicæ, apta dieta, et alvo bene ordinatâ moderantur. His adjicendum quod struma sæpe testes afficit, morbus in quo viscera chylopoietica, indicia valetudinis nunquam reddunt. Denique ex herniâ humorali (quod exemplum a Johanne Huntero ad demonstrandum cursum consortii a teste ad ventriculum citatum) hoc consortium, reciprocum esse constat. Quippe nihil hoc certius esse potest, quam quod inflammatio testis ventriculi nauseam movet ita (aliis remediis frustra adhibitis) nauseæ vel vomitus superventus, frequenter inflammationem solvit.

I differ with Mr. Hunter with respect to some of his deductions on the subject of sympathy; but it is not my object to criticise what he has done on this subject. It is quite evident that he was fully aware of its importance; and my object is to shew what is true and useful, and how it is so, and not to argue on what may be erroneous or doubtful. Thus, speaking of sympathies as similar or dissimilar, he thinks continuous sympathy is similar; but surely the effects of a blister and the occurrence of boil, though in principle the same, *appear* very different. The manifestation of a sympathy does not, however, appear to be necessarily different in principle, because the obvious character of the indication is different. He says, for example, that sickness of stomach cannot produce sickness any where else. Granted: but, if the stomach manifest its sympathy by sickness, the bowels by purging, the kidney by the secretion of more urine, and so on, these symptoms may not differ in principle, or in the law of which they are the emanation, although the peculiar mode of manifestation may be different in different organs. I do not assert that they are the same; but making distinctions of similarity and dissimilarity, unless we can demonstrate that they are essentially different, seems rather to encumber the investigation. What we are interested in knowing, is, the more frequent mode of occurrence, and the law which regulates it; and not whether they are similar or dissimilar. These seem terms too general to admit of proofs, much less of useful practical application.

Again: Mr. Hunter remarks, "The stomach appears to have this connection (sympathy) with the body more than any other part." This is a doubtful proposition. The heart is primarily affected, without the stomach appearing to participate. Neverthe-

less, the stomach is very rarely affected independently of the heart; and, if we could discriminate more nicely than we can do as to the different characters of the pulse, perhaps we should find that the stomach never sympathizes without the heart and arteries doing so also.

DISCOURSE IV.

PHENOMENA OF SYMPATHY CONTINUED—ALIMENTARY ORGANS AND UTERUS.

Mr. Hunter has observed, that the part sympathizing will sometimes be more prominently affected than the part with which it sympathizes. This is very true in regard to any two organs whatever, although it is much more frequently demonstrable in some cases than in others. It is, however, no where more important to recollect this fact than in relation to the sympathies which take place between the alimentary canal and the uterus; nor are there any cases in which a judicious application of the phenomena of sympathy is of more practical value, since they will often enable us to relieve, and indeed remove, some of the most troublesome and annoying kinds of disorder, which are either too often unsuccessfully treated by specifics, or left alone as out of the reach of science. By the former, I mean various irregularities of the menstrual function, and leucorrhœa; by the latter, irritability of stomach, and especially that which is too often concluded to be the unavoidable attendant on pregnancy. I will illustrate this by a case or two. A woman, of fair complexion, about thirty-two years of age, with an exceedingly wan countenance and emaciated frame, applied to me for relief from a profuse leucorrhœa. She stated that she had married five years previously; that, antecedently to her marriage, she had had uninterrupted health, but that, a few months after her marriage, she began to feel unwell, and a discharge occurred from the vagina, from which she had never since been entirely free, although it had varied in quantity. She was very much reduced, and her countenance had that pale, sickly hue, with a patch of red on either cheek, which made her look more like a patient in consumption than anything else. On examining her, however, I could not make out that she had any affection of the lungs; but her bowels were always obstinately costive. I put her on a very plain, nutritious diet, told her to clothe warmly, and took measures for regulating her bowels. The latter, as in most cases of the kind, proved a difficult task; but it was at length (as it may generally

be, if the true principles on which it should be attempted are observed) accomplished, when the leucorrhœa ceased. She also gained flesh, lost her peculiar, unhealthy aspect, and became perfectly well. Now, if any one will consider well the few facts I have here stated, he will see that the case was very unpromising; yet it is very valuable, and, in my mind, very clear as to its rationale. Her bowels had been always costive. So long as the uterus had nothing to do but to separate the menstrual fluid, it seems to have remained undisturbed; but, when called upon to execute its higher functions, it showed its inability by disorder and irritation. The predisposing and the exciting cause were equally clear; the correction of the bowels removed both.

In some cases the digestive organs appear to be performing their functions so far well, that the patient is free from indisposition; yet, on her becoming pregnant, a most distressing irritability occurs in the stomach. There is, in many instances, almost constant nausea and sickness; and the affection is either regarded as necessarily incidental, quoad that individual, to the pregnant condition. Now I do not mean to say what proportion of these cases are relievable, or otherwise; but this I do assert, that many of them do not depend on the sympathy, in the strict sense of the term, excited by the uterus, but upon this sympathy acting on organs previously, or at the time, in a state of disorder. That there is some condition of the system favouring this sympathetic disturbance, is clear, because the latter is by no means constant; many women being entirely free from it; and that it depends on disorder of the digestive organs, *otherwise* induced, I am well convinced. This disorder too, where it already exists, is very apt to be aggravated by the idea which is generally entertained, that women admit of, if they do not absolutely require, a more full diet during the growth of the child in utero; which, where the digestive organs are already deranged, of course increases the mischief. Another fact worth observing is, that when the child advances, and when, therefore, we may presume that hypernutrition may be advantageously disposed of, the sickness not unfrequently ceases. Be this as it may, I have seen cases in which sickness was habitual during utero-gestation; and yet, where attention having been paid to the chylopoietic viscera, it has wholly ceased, independently of any other measures. A well-marked case occurred to me in a young woman, who had borne several children, and in whom this sickness had constantly been an attendant in pregnancy.

Her tongue was very irritable, and the secretions from her bowels irregular and disordered. It was clear, also, that the biliary secretion was out of order. On the correction of these, the sickness wholly ceased, by which, in former pregnancies, she had never failed to be more or less troubled, except at short intervals. My experience, in cases of this kind, is necessarily limited: but I hope my professional brethren, who practise in this department, will excuse me if I press on them the consideration of the sympathy in question. Granting that, under the circumstances of the purest health, the stomach is excitable during pregnancy, is this the time for allowing that extension of the diet scale, which is so commonly the case as regards quantity in the management of pregnant women? Does not an irritable stomach require, under any circumstances, every practicable avoidance of disorder? and why should we take exceptions, or be less vigilant, where it occurs from sympathy with the uterus? Granting, for the sake of argument, that, cæteris paribus, a more generous diet may be expedient, still no nutriment can be obtained from food which excites nausea and sickness. If, too, this sympathy be disregarded, may it not react on the uterus? I am firmly persuaded that it may; and that, in this way, miscarriages have occurred from reflected sympathy on the uterus from the digestive organs. I have seen that which convinces me, that, even where the child is not born till the full time, its strength and growth are materially influenced by the condition of the digestive organs of the mother during pregnancy, as characterized by irritation or tranquillity. Indeed, the whole phenomena of sympathy render it apparently monstrous, to suppose that the function of the uterus can be wholly uninfluenced by constant irritability of stomach, merely because it may not have induced abortion. Many cases of deficient and difficult menstruation have fallen under my notice; and the dependence of this state on disorder of the digestive organs, has been so frequent and well marked, that it appears to me to be the most frequent cause of these affections. In the Remarks on the Unity of the Body, I have mentioned a well-marked case, which I will not repeat farther than to say, that it had been treated by specifics and other measures, under a very popular physician, without any success, but that it yielded to attention to the alimentary canal and skin, without any difficulty whatever; and without the employment of any of those remedies usually exhibited with a view to influence the uterus specifically. I have met with these cases in patients who

have consulted me for other reasons. Not very long ago, a lady consulted me for a slight sprain of her hand. On seeing her, I told her that so trivial a cause would not have induced so much inconvenience (for the effort was a very slight one, and the weakness consequent on it was very great), if her health had been in good order, for that I perceived it was much otherwise. I found that she was well aware of this, and had had a great deal of advice before, without having derived therefrom any material benefit. Her tongue was foul, her appetite irregular, and she suffered much from pain in the head. What she most complained of, however, was the extreme suffering she endured at every return of the catamenia; in other respects she was regular, but thought that they were rather too abundant. I put her on a strictly plain diet; gave her occasional aperients to regulate her bowels, which were disposed to costiveness; told her to take exercise, and put her feet in warm water at night. In a few weeks she lost all her symptoms, and the first return of the catamenia gave her no suffering at all; nor did they on the second return; after which, as she was perfectly recovered, I saw no more of her. The sprain got well; rest being the only measure adopted for its cure.

But it is not merely in pregnancy, or in the various disorders of the menstrual discharge, that the sympathy between the uterus and alimentary canal is so strikingly manifested; nor is it in these only, that measures directed to the alimentary canal procure relief. Various cases of hysteria seem better combated by attentions to the alimentary canal, than by any other method. I recollect a young girl in the Dispensary, who laboured under a curious variety of symptoms: at one time they were very like stone in the bladder; at another, they closely simulated stricture of the rectum. Examination, however, could discover no disease of these parts. Then she complained of severe pain shooting through the parts, from before backwards: at other times she had severe pains in the abdomen. The history of the case only shewed that she had been bred in the country; that, subsequently, she removed with her parents to London; and that, after she had been about a year in London, the symptoms commenced with sickness and fainting fits: the development of her local symptoms succeeded to these disturbances. In this case, various specifics were tried in vain; and, amongst others, at the recommendation of a friend, who had seen it successful in similar cases, the ergot of rye: but nothing seemed to

do any good. Her sufferings were often extremely severe, so that she could not rise from bed for pain. Counter-irritants were applied to the loins; and I scarcely know any measure, which has any reputation in such cases, which was not, at one time or other, unsuccessfully tried. They were combined, too, with every possible caution in diet: but all failing, I at length advised her to take no medicine, except a weak solution of salts in mint-water and tincture of lavender; and this only when her bowels required assistance; in other respects, to continue her plan of diet, and to take exercise. Under this plan she ultimately got well: but I cannot say whether it was in consequence of it, for she was very many months under treatment: however, I never saw any case of hysteria where the patient suffered so much actual pain as in this case. I merely, therefore, state this brief summary of the facts as they occurred. Not the least curious disorders of the uterus, are those in which the symptoms so closely simulate pregnancy, as occasionally to have puzzled the most experienced accoucheurs. In the woman, whose case I have mentioned elsewhere*, there was a regular increase of size for ten months; sickness of a morning; some little shew of the catamenia, but scanty and pale, remaining: she felt motions, which she said were like a "little bird;" the os uteri was felt as high as the finger could reach; the breasts were full and painful, and a little milk-like fluid oozed from the nipples; collected in a glass, it appeared like poor milk, and threw down albumen when tested by nitric acid. She had pains in the loins and head, and her feet swelled *occasionally*. The tumor of the abdomen seemed ill-defined, and higher than the pregnant uterus, and imparted the feeling that it arose from the right hypochondrium; although she stated, distinctly, that it began low down on the left side. This woman took some pills, under the direction of her ordinary medical attendant, after I had seen her, which acted powerfully on her bowels; when the tumor gradually disappeared, and she got quite well. I should state that she had been married ten years, and borne one child only, which was about eight years previous to her present complaint. This sympathy is so well known, that I should not, in this place, have said so much about it, but with a view to impress its practical application in a more sedulous attention to the digestive organs, than I believe has ordinarily been

* On the Unity of the Body, &c.

paid to them; for although it is undoubted, that in many cases where the digestive organs are sympathetically affected, they are, as in many cases of pregnancy, the first deranged; yet the sympathy is often not manifested until some new action is set up in the uterus, as in the process in question, or when the manifestations on the part of the uterus are not in a natural function, but in some departure from it, as in disorders of the catamenial discharge. It is not always easily determined whether the uterus or the alimentary canal be primarily disordered; the reciprocal sympathy is the thing to be remembered; of this the proofs might be indefinitely multiplied; and the practical application of it consists in attention to the alimentary organs, to which we can direct tranquillizing influences, in cases where any direct appeal to the uterus is either in the highest degree uncertain, or altogether beyond our power.

ALIMENTARY CANAL AND MEDULLA SPINALIS.

I believe that the effects on the nervous system, sympathetically induced by disorder of the alimentary canal are now well known, and admitted. That impressions, primarily addressed to the nervous system, will disorder the functions of assimilation, is equally a matter of daily demonstration. I shall have to speak a little more of this in connection with the mind. I am now desirous of considering, especially, the sympathy which exists between the alimentary canal and the spinal marrow.

That disorders of the alimentary canal will disturb the important functions of the spinal marrow, there can be no reasonable doubt, at I shall endeavour to explain; and that diseases and injuries of the spine affect the secretions from the alimentary canal, is well known. The latter circumstance is adverted to by Sir Benjamin Brodie, in a good practical paper on diseases and injuries of the spine, read last year before the Royal Medical and Chirurgical Society.

Now it has already been mentioned, that cramp, St. Vitus's dance, and convulsions (all affections of voluntary muscles supplied with nerves from the spinal marrow), often proceed from irritation in the alimentary canal: and worms supply us with an

example so familiar, as to be as well known to the public as to the profession*.

Now, when we recollect that one of the functions of the spinal marrow is to regulate the actions of the voluntary muscles; and that, in the above conditions, volition is for the moment destroyed; the conviction that the medulla spinalis is affected *in some way or other*, is unavoidable; that the cause too is originally in the alimentary canal, is proved by the expulsion of the worms, and the correction of its other disorders. We may not be able to understand the destruction of volition any more than its exercise; but we know that voluntary power is impaired; we know that affections of the spinal marrow disturb its exercise; and we know that these, when serious, destroy it altogether.

I now beg you to consider that very curious and dreadful disease, tetanus, or locked-jaw. Its essential character is a violent action of voluntary muscles, altogether independently of the will of the patient. When confined to the face and jaw, we call it tetanus, or locked-jaw; when affecting the muscles in front of the body, emprosthotonos; when those of the back, opisthotonos. It is a very curious thing: a man receives probably a slight wound (such, perhaps, as he may often have received before without any material inconvenience), followed in a few days by this terrible affection of the muscular system. Now you know that, for the most part, wounds produce no such consequences; and, it is equally certain, that, in many cases, the patients have experienced this at former periods in their own persons. This is a very important point: for, from it, we deduce no less than this, that the wound cannot have been the direct cause of the tetanus; but that it has occasioned it through an influence which owed its disordering effect to *some* peculiar condition of the body on which it was exerted. What this peculiar condition may be, is one thing; its existence, another: the latter is certain; the former may or may not be ascertainable.

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* Dr. Whytt mentions two cases of convulsions from worms, which I refer to, as shewing, or rather impressing the fact, that worms only produce them by reason of the irritation they create in the alimentary canal, *in common* with other causes. The patients were a boy and a girl, of about the same age; and, in the boy, the same symptoms recurred with alimentary irritation, without any worms being present. People are often surprised that children, with the usual symptoms of worms, are found to have none; not knowing that many, or, indeed, in certain cases, *any* other sources of irritation will produce the same symptoms.

Now, visible changes are sometimes detected, in these cases, in the spinal marrow; but, besides that these changes are seldom found, the question still recurs, how happens it that these changes are produced by a kind of injury which is happening every day, without the production of any such phenomena? We can, indeed, make out no connection between the character of the injury and the occurrence of locked jaw; for, whilst it is true that locked-jaw occurs after amputations, lacerations, and other injuries of a violent nature, it occurs just as frequently from injuries of a slight and trivial kind. It is said, that wounds of tendinous parts are more apt to be followed by tetanus than any others. It may be doubted whether we can safely assume this: but I cannot enter into that question at present. One thing, indeed, we know,—that injuries of parts of low organization (whether by neglect on the infliction of the injury, or as the direct consequence of the injury, as in dislocations, sprains, and so on) disturb the system more than injuries to many other parts; and that sickness, a symptom affecting a very important alimentary organ, is a striking feature in such disturbance. If tetanus, then, result from any peculiar disposition of the spinal marrow, in regard to which the wound can only be considered as the exciting cause, you can see at once that the very essence of the enquiry into the causes of tetanus consists in the ascertainment of all influences capable of altering, or in any way disturbing, the spinal marrow.

Now, we know that disturbance of *any* part of the body is competent to disturb the whole nervous system; *a fortiori*, therefore, disturbance of any part may disturb *any* part of the nervous system.

Then, again, we know that no organs disturb the nervous system more frequently than the alimentary organs*; and, if they

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* In the cases of tetanus, many of which are related in the Medical Observations and Enquiries, costive bowels occur almost without exception. The most successful treatment seems to have been the alternation of aperients and opiates; which latter seem to produce an opposite state of the spinal marrow. Further, in a paper on the good effect of cold bathing in tetanus, in the sixth volume of the work just quoted, the very first case again was combined with costiveness; and one of the first effects from the cold immersion was a natural stool. How strongly does all this point, together with the impressions on the skin which appear to produce tetanus in hot climates, such as exposure to night dews, &c. (see again the volume already quoted), to the skin, bowels, and medulla spinalis, as the chief agents in the causation of this frightful malady.

disturb the *whole* oftener than any other organs, it is assuming very little to say, that they will, at least, *as often* disturb a *part* of the nervous system: in this case, the spinal marrow.

In a child of my own, violent fits and convulsions were relieved, in a few moments, by the injection into the bowels of warm water, and the consequent evacuation of them. Considerations, then, of cramps, convulsions, St. Vitus's dance, in connection with marked alimentary disorder, induce the conviction, that disorders of the alimentary canal may produce a very disturbed condition of the medulla spinalis; and I am satisfied, that, through the intervention of this state, they become one class, at least, of the remote causes of tetanus. I shall have to describe this disease in another volume, when all the facts will be considered. In sympathy, I prefer the contemplation of the living human body to all other modes of investigation, supported, of course, by the requisite preliminary knowledge; but those who like another mode of demonstration I may refer to Dr. Whytt's experiments on frogs. I will mention one or two of them. He laid bare the muscles of the abdomen, in a living frog, and applied a solution of opium to them. In other cases, he injected a solution into the bowels: the frogs were first seized with paralysis of the lower extremities, succeeded by universal torpor, and death. In other experiments, he first destroyed the spinal marrow, when the opium, so applied, no longer produced paralysis, although the heart continued to beat for some time. Dr. Whytt also injected a solution of opium into the rectum of dogs, with the effect of producing paralysis of the posterior extremities: yet, when one of these dogs was purged severely by a strong injection of salt and water, he gradually recovered from the paralysis*.

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* Now here the observation of the common disease, worms, as establishing the sympathetic affection of the spinal marrow, appears to me to be, in a practical sense, still the more valuable demonstration. I admit the force of the experiment; but, in those cases, we have another animal, and, in the case of the frog, one of a very different order from ourselves; whereas, in the other, we have the natural manifestation of the sympathy, in the very animal whose diseases it is our especial business to study.

There was recently a boy in the Dispensary who voided worms both by the mouth and bowels. I gave Dr. Campbell a large tape-worm, which was ejected from the mouth. The patient got well by aloetic aperients. A few days since, he re-applied, in consequence of having been seized with fits of an epileptic kind; and he complains of a "gnawing sensation in his bowels." This patient again recovered by the same means; but without any further appearance of worms.

There is no sympathy with which a familiarity will be more useful than that under consideration; since it will lead you to discriminate, with more correctness than any single principle with which I am acquainted, a class of cases of all others most puzzling and important. I allude to those in which irritation of the spine, thus produced, simulates disease of the vertebral column: you must recollect, however, that the alimentary canal is seldom singly affected. Usually, long before we are consulted, the sympathies of various organs produce simultaneous disorder in the liver, alimentary canal, and other parts; and we have to collect, from the history, which organ has been primarily affected; but, fortunately, the laws of sympathy, although (as I shall hereafter more particularly explain), they render the detection of the organ primarily affected a very desirable object, do not always, nor even frequently, render it an essential one. I shall now put some of this matter before you in a case or two.

CASE I.

I was consulted in the case of a lady who laboured under a great complexity of symptoms. The history she gave informed me that the first complaint for which she sought advice was a pain which was referred to the uterus; but the same history afforded undoubted evidence that her biliary secretions were disordered antecedently to the complaint for which she first sought advice. Immediately previous to my seeing her, an opinion had been given that she had a lumbar abscess; and it was the circumstance of her medical attendant in ordinary differing from this opinion, which led to my being consulted. I found her with some tenderness in the region of the liver, the secretions of which were disordered. The catamenia were deficient; and examination of the uterus disclosed a tender condition of the os uteri on its left side. The rectum was extremely irritable: she suffered great pain in passing her motions; and at other times also. Examination of this part shewed the sphincter to be very irritable; and the bowel felt extremely hot. The examination, also, though conducted with all possible gentleness, gave her acute suffering. No disease, however, was discoverable, except a few wart-like projections, as high as the finger could reach, and a certain plicated condition of the bowel, which is common; the arteries, however, throbbed most vehe-

mently. She had considerable tenderness along the lower part of the spine; and there were a fulness and tenderness in the upper and inner part of the left thigh. Continuing the examination, I found that she was also very tender about the course of both sciatic nerves and over the capsular ligament of the hip joint. I should mention that some of her advisers had referred her complaints to the uterus. Her bowels were disposed to costiveness; her tongue whitish-yellow, and furred; and she had cramps in her lower extremities. A careful consideration of all the circumstances, and connecting them with impressions derived from other cases, induced me to pronounce an opinion, that she had no disease either of the spine or uterus; that, in fact, the disorders of these parts consisted in a deranged state of their nervous sensibility, dependent on disorder of the chylopoietic viscera; and, as it appeared to me, probably originating in the liver. She was treated on principles emanating from these considerations. Simultaneous appeals were made to the skin and the alimentary canal by warm water injections and the vapour-bath; alterative medicines, containing small doses of mercury, with a view to solicit the liver, were combined with a very cautious, moderate, and plain diet; and, towards the conclusion, she now and then took an aperient, to which a little of the vinum colchici was added. I saw her but occasionally, as she was ordinarily under the care of another gentleman, whom I met now and then in consultation. She, however, got relieved from all her symptoms; and I saw her, eight months after her recovery, looking and feeling well. She is unfavourably circumstanced as regards the observance of exercise, and other means of a preventive nature, the necessity of which I endeavoured to impress on her; but, with the exception of being obliged to pay more than common attention to keep her bowels regular, she is free from complaint.

CASE II.

A young lady, of a very nervous, delicate temperament, and fair skin, consulted me concerning a pain in the hip, which the most distinguished surgeon of the day had pronounced to be disease of the joint. I examined the hip very carefully, and also the general functions of the body. Her health was exceedingly deranged; her bowels disposed to be torpid, and then acting very irritably;

her digestion was impaired, and her tongue white, with a paucity of secretion, a line of frothy saliva being generally visible on either side of it. She was very excitable. She had pain in walking; but this varied, walking very much better sometimes than she could at others. The pain was distinctly referred to the hip. She had also pain in the back, which prevented her from sitting up long together; and, if I recollect rightly, she had some uneasiness referred to the knee also. There was, however, no tenderness on pressure on the front of the joint, nor any pain when the head of the femur was struck against the acetabulum, by a blow on the sole of the foot, during extension of the limb. Although I had seen disease of the hip without these latter symptoms, I could not arrive at the conclusion that her hip was diseased, taking all the circumstances of the case into consideration. She had, on a former occasion, consulted me for an anomalous pain in the foot, accompanied by a blush of redness on the tarsus; but this last yielded to measures directed to her general health. As, subsequently to that period, however, she had been under the care of another gentleman for the disease now said to be in the hip, and, as I had seen an opinion in writing, given by the very eminent surgeon to whom I have alluded, that the disease was an affection of the hip, I declined, as I could not participate in this impression, undertaking the case, without a consultation with the surgeon in question. This, however, she steadily declined; but added, that I might consult with any other surgeon or surgeons I chose; which I acceded to, she naming the surgeon, who was Mr. Abernethy. I begged Mr. Abernethy to examine the joint very carefully, which he did; and, in the end, declared his opinion to be the same as my own; namely, that the case was a disordered condition of the nerves of the limb, depending on the general state of her health and nervous system. An issue which had been made was allowed to heal. She was made to take exercise; and her diet and her secretions were carefully attended to. I had much trouble with her stomach; and her tongue remained for a long time with the irritable character I have mentioned. She ultimately, however, got perfectly well; had a short relapse of her symptoms, but again recovered, and, so far as I have been able to learn, had no return of them. I may mention that, in both instances, her tongue changed its unhealthy appearance before her recovery, and, on the first occasion, under the use of small doses of dilute nitric acid. During the relapse, however, the nitric acid produced no benefit; her recovery being

due to the regulation of her diet and her secretions, with air and moderate exercise, fatigue being always avoided. That cases of this kind may and do terminate in disease is very probable; but this only adds to their importance and interest; whilst the true mode of causation of many of them is, I believe, *generally* an irritable condition of the digestive organs, acting on the spinal marrow, which again disturbs other parts. I should observe that the opinion given by the eminent surgeon to whom I have alluded had led her to adopt the treatment which he recommended; and it was only on her having pursued this treatment for two or three months, without benefit, that she again applied to me.

I knew a young lady, who died, after having suffered, at intervals, for nine or ten years, with what I verily believe to have been a disturbed state of digestive organs, acting functionally on the spinal marrow, which again re-acted on the general health. I saw her only in the last months of her life; and I regret to say that she died at a distance from me, and under circumstances which rendered it impossible for me to procure, much less to witness, an examination of her body. She had, however, very much the same state of health as the lady whose case I have just mentioned, but with many aggravations. Her tongue was much drier, and at times more vascular; but still its general characters were the same. Her countenance was yellow, her biliary secretions were much disordered, and her stools black. Catamenia absent, occurring at long periods, generally of about three months. Pain across the stomach and left side, and tenderness in the same situation. Cold feet, and inability to walk more than a very short distance. She had considerable tenderness about the last dorsal and first lumbar vertebræ; and, immediately in this situation, there appeared to be a slight projection. She had symptoms at one time which, they said, had been referred to disease of the chest, and which became renewed on the approach of winter. She had nothing of this kind during the time I saw her. I attended her for some time; and she certainly improved in strength and appearance: her secretions also became nearly, and at one time quite, natural; but she removed to a distance from me at this time; and, in a consultation with her family, I stated that I should be happy to see her when it was practicable; but, in a case so serious, it was impossible that I could, at such a distance, and seeing her at such long intervals, charge myself with the responsibility of the result. Having experienced some benefit, as I have said, she ultimately

sank; the chief symptoms being a thoroughly deranged state of digestion, with a gradual depression of the vital powers. Now, although she had the condition of spine to which I have referred, it had existed without any alteration or amendment for three years; there being no further appearance of projection, or any other alteration whatever. I have already stated that the amendment, under my care, was temporary; but I have never ceased to think, that, had she been under constant surveillance, she might have recovered; but to treat such a case without the opportunity of exercising due vigilance over it, is out of the question.

A great deal of interesting matter will be found, in connection with the brain and spinal marrow, simultaneous with disorder of the stomach, liver, and lungs, respectively, in the Gulstonian Lectures of Dr. W. Philip, especially the third lecture, in which the cases shew to me clearly that the disorder commenced in the viscera, and that the organic effects on the brain were secondary. I therefore do not literally agree in the conclusions which Dr. W. Philip appears to deduce; but, practically, the difference is unimportant.

My advice was once asked concerning a lady who had a very curious set of symptoms, referred to the spinal marrow; one of which was, that the most trivial pressure on the vertebral column produced the most excruciating suffering. A very eminent surgeon, who had formerly attended her, not thinking this possible, had made the experiment, no doubt very much to his own regret, as he was fearfully convinced of its truth. My opinion was merely asked once about the case: it was a long distance from town, and I only saw the patient on that single occasion; but I recollect that her digestive organs were exceedingly deranged, and did not appear to me to have been attended to with that scrupulousness which was necessary. I gave it as my opinion that she would not recover; and she died a few months afterwards. Her body was not examined.

Another case of affection of the spine occurred, with which I had nothing to do, but which I cannot but conceive very important. The lady in whom it appeared had scarcely moved off the sofa for years. She had had a great deal of the best advice which this town afforded; and, when I saw her, she had long given up every idea of treatment. I was never myself consulted in this case; but some friends at length advised her to consult a very eminent practitioner in the country, under whose care she became, in a few

months, perfectly well. Now I know that she took some medicine, the nature of which I did not ascertain; otherwise her treatment consisted of gradual exercise, first with support, and subsequently without any; her diet being very strictly regulated.

I could mention many other facts pointing to the sympathy between the alimentary canal and the spinal marrow; but I have said enough to excite your attention to this important subject. I will, therefore, only quote one more case, and, with a short commentary, conclude this section.

Mr. Leigh, assistant-surgeon to the Dispensary, mentioned to me a very well-marked case in connection with this subject. A young gentleman was affected by occasional spasms of the muscles of one side of his face, apparently affecting chiefly the zygomatici and the rectus externus of the eye. He laboured under symptoms indicative of disordered liver and alimentary canal. Under treatment, he voided some worms; and this was followed by relief of the spasmodic affection. A similar result followed the relief of subsequent alimentary irritation, which, however, was *independent* of the existence of worms. It appears, however, that the measures which were recommended for the continued tranquillity of the chylopoietic viscera have not been persevered in; and the result is, that he has now impeded volition, affecting, more or less, one side, so as to threaten, at no distant period, paralysis. Not the least important part of this case is the fact, that, previous to the influence wrought in his case, by the measures to which I have alluded, several of the reputed specifics for such affections had been tried in vain.

Now, if disorders of the alimentary canal will thus induce derangement of function in the spinal marrow, what reason is there that they should not produce disease of the vertebral column? There are many reasons in favour of the probability of their doing so; and not one that I know of against such probability. We know that nothing is more common than for disease of structure to be preceded by disorder of function. We know, too, that there is a great disposition in parts, especially important parts, to transfer their irritation to structures in their neighbourhood of less importance; in which relation the vertebræ stand with regard to the spinal marrow. We know, too, that lumbar abscesses occur without necessarily being accompanied by any disease of the vertebræ. We also know that persons, both antecedently to, and contemporaneously with, such affections, have, almost invariably,

disorders of the alimentary canal, and some of them mesenteric disease besides. I cannot, *at present*, enter into the important practical application of these facts to a more refined and strict treatment, both as regards the spinal marrow and the alimentary canal; but I am convinced that it admits of improvement. I here mention only so much as seems calculated to impress on you the existence and the importance of the sympathy in question. I have thus concluded what I think it necessary to say in this place, as illustrating the sympathies of the alimentary canal. There is no affection of the body with which it does not sympathize; nor any that it (the alimentary canal) does not produce, either by direct or indirect modes of causation. Something, however, I shall yet add, in connection with bones, muscles, cellular tissue, &c. under distinct sections; and I now proceed to illustrate the sympathies of certain organs co-operating in the grand functions of the alimentary canal, considered in respect to their sympathies with other parts; those with the alimentary canal itself having been already, for purposes of illustration, sufficiently discussed.

LIVER.

Dr. Wilson Philip observes, in a paper published at the end of his Gulstonian Lectures, speaking of the insidious nature of affections of the liver, and the frequent participation of this organ with general disorders of the system: "For more than twenty years, I have examined the state of the liver as constantly as that of the pulse, and often derived more important information from the former than from the latter examination—a proof of the extent of the vital sympathies of this organ." I shall here quote Dr. Wilson Philip in reply to a remark made in reference to what I had observed, in my book on the sympathies, as impressing the argument of the "Unity of the Body" (Highley, 1835). In that book, I state that the liver is generally more or less affected in diseases of the lungs. A reviewer denies this fact. I am happy in being able to quote a gentleman of Dr. Wilson Philip's experience on a point which (notwithstanding that which I have had in morbid examinations), may probably be considered as falling more within the province of the physician. He says that there is a species of consumption which originates in derangement of the liver (of all its forms the most common in this country); and, after adding that it

is very remediable, and that he has seen it in families of which some of the members had fallen victims to pulmonary disease, where this organ had been overlooked, &c. he says, "To this sympathy thousands yearly fall a sacrifice in these kingdoms, all of whom might be saved by so easy a precaution;" that is, attention to the biliary disorders which precede or accompany the earlier symptoms of pulmonary disturbance. "Affections of the liver influence the brain in a similar manner; and disorders of the brain affect the liver more than any other distant organ." In relation to this sympathy, see a case mentioned in connection with the treatment of inflammation.

The liver is the largest organ in the body; yet its functions are very imperfectly known; and, although we must feel much indebted to gentlemen who labour so industriously in explaining its minute structure, yet I am convinced that a more fruitful source of enquiry will be found in a careful observation of its phenomena in the living body. We know that there is a very marked sympathy between this organ and most others; and, indeed, we cannot assert that there is any one disease in the body which is not more or less frequently influenced, either in its causation or its progress, by the state of the biliary function.

When we consider the vast quantity of blood poured every second from the liver into the heart, through the inferior vena cava, we must perceive that the heart will be readily influenced, at least by the quantity of blood coming from such an abundant fountain; and, accordingly, we scarcely see any affection of the liver in which the actions of the heart are not more or less affected. I knew a gentleman, whose case I have already mentioned, whose heart was for a long time in an exceedingly disturbed state, and in whom nothing appeared to do so much good as a dose of calomel, unless, perchance, he lost, which he sometimes did, a little blood from the hæmorrhoidal vessels. His liver was obviously disordered, and had been so long anterior to any affection of his heart. The following case is one of interest: Mr. Thorne asked my advice with regard to a female who had vomited a very large quantity of blood. Mr. Thorne gave the following as the previous account of the case: "Mrs. G. of leucophlegmatic temperament, was attacked, about three o'clock in the morning of May 1, 1836, with hæmatemesis. I saw her about nine, A.M. and found that she had vomited from about a pint and a half to a quart of blood. The countenance was pale and anxious; pulse about 100, small and powerless

"bowels rather costive, which were habitually so. I gave her an aperient effervescing mixture, which quieted the stomach until the next morning, when I was again summoned to her assistance. She had vomited about a quart of blood about half an hour before, and complained of nausea; fearing that the vomiting would again recur. The bowels had been opened by the medicine: stools dark and fœtid. On examination, I found a strong pulsation just below the epigastric region, which, from the large quantity of blood which had been discharged, led me to imagine that an aneurism had burst into the stomach. The catamenia were present at this time. There was some slight tenderness about the epigastrium; but little or no pain in the stomach. I gave her small doses of the plumbi acetas and opium. The discharge of blood ceased during the day, but recurred the next morning to an appalling extent. The stomach was still very irritable, occasionally throwing off large quantities of bile." It was at this time that I saw the case. I found that the heart was acting in a very disturbed manner; but a careful examination of the epigastric and abdominal regions induced me to refer the pulsation to the aorta. There was tenderness across the epigastrium. The patient was very much reduced, and pale. I found that she had habitually very costive bowels, and occasional uneasiness, referred to the right side; that her attack had been preceded by, and that she had been subject to, palpitations. I told Mr. Thorne that I was disposed to refer her symptoms to a congested state of the liver, probably of long standing; that I referred the disturbance of the heart to the blood derived from this source; and that, during its disturbed action, some vessel in the stomach, to which organ there might have been a sympathetic determination, was probably the source of the hæmorrhage; that, in so reduced a condition, and under such circumstances, the prognosis was most unfavourable; but that, if he concurred with me, I should act on the foregoing opinion, and limit our measures to acting directly, and by such modes of sympathy as we could command, on the liver; having also a view to determine to the surface of the body. I therefore directed that nothing should be put into the stomach but five grains of calomel (to which I found Mr. Thorne added ten grains of the extract of rhubarb), and that this should be repeated every four or five hours, if she lived, or if the intention of procuring profuse discharges of bile rendered it necessary. I also ordered, to maintain her powers, injections of gruel by the lower bowel, and, as

she lay, the skin to be excited by a flesh brush. These measures were followed by a discharge from the bowels of very copious, dark-coloured evacuations. There was no return of the hæmorrhage; the vomiting from this time ceased; and she began to gather strength rapidly. Mr. Thorne assured me, a short time since, that the patient remains quite well—May 1837. I saw Mr. Thorne yesterday, May 29; and, mentioning this case, he said it was pure blood; that it separated into its serum and crassamentum; and was not distinguishable from blood which had been drawn from an arm into a vessel.

I met with another case, very similar to the foregoing, but still more complex, in which the disorder of the liver *apparently* had, for years, produced at intervals the most inveterate irregularity of the circulation. That the liver will induce sympathy of the heart in other ways is very probable; and that disturbances, acting primarily on the heart, will produce disturbance of the liver, I am certain. One of the most diseased hearts I ever examined was in a patient whom I did not see during life, and in whom no disease of the heart had been suspected, but in whom the symptoms were for the most part referred to the liver, which, however, was nearly sound, whilst the heart had become much enlarged, and its whole structure changed. I shall have occasion to recur to this sympathy in connection with inflammation.

LIVER AND HEAD.

I recollect a case where this sympathy was very marked, and where the progress of the cerebral affection bore such a relation to a growing disorder of the liver, from neglect of prophylactic measures, that, if I wished for a case for the purpose of demonstration, I could not have had a better. Years elapsed, during which the biliary disturbances were of the most obvious nature; whilst the cerebral were only evinced by pain and confusion of ideas, both trivial and temporary. At last, the frequency of bilious attacks was greater; the cerebral affection more striking and less transient. Then, at last, one eye became amaurotic; and, soon after this, the bilious attack was accompanied by a sort of epileptic fit. Finally, the patient died. Now, for many years, this case was extremely tractable; nay, even after the loss of one eye, and the epileptic fit, it continued so, by means wholly directed to the liver;

but nothing could induce the patient permanently to refrain from exposing himself to all sorts of exciting causes, both moral and physical. Reiterated attacks were always the consequence; and, on this persistent disorder of function, structural disease was subsequently superinduced. Perhaps, however, it is not necessary to say more on a sympathy so well known; but I may just allude to the almost constant co-existence of hepatic and cerebral disturbance in almost every variety of fever with which we are acquainted. With regard to the liver and spleen, the few remarks I have to offer will be included in the consideration of the sympathy of the latter organ. The sympathies of the liver and alimentary canal and skin have already been sufficiently spoken of under the respective sections. The sympathy between the liver and urinary organs has been dwelt on as much as I think at present necessary; and the remainining structures, as sympathizing with the liver, will be remarked on under their respective titles. I know of no sympathetic connection manifested by any of the chylopoietic viscera which is not manifested by them all, although not always equally well marked, because more strongly excited in some than in others. Nor is there any organ in the whole body whose general participation in disease is more universal, more influential, more important, or more insidious or marked, than that of the liver; at least there is no organ which combines these characters in such a degree.

SPLEEN.

We know little, if anything, of the functions or use of the spleen; yet there are circumstances, besides what we might infer from analogy, which leave little doubt that its sympathies are important. With regard to the experiments made on living animals, to determine the functions of the spleen, they prove nothing. Some animals died when deprived of their spleen; some pined after a certain time; some became fat, and then again pined; and, lastly, others did not seem much the worse for the loss of the organ. To conclude, however, that this organ is of little use in the animal economy is by no means a safe inference from these facts; since its loss may have been supplied by compensating functions. Such a conclusion would lead us into various errors. As well might we infer that the lungs were unnecessarily large, because many individuals live with little inconvenience in whom it is certain that, for a

long time, a portion of the lungs could not have performed its functions; that one kidney is sufficient, because it is occasionally found adequate to effect the secretion of urine; or that the liver is, in great part, unimportant, because we find, in many cases, so small a part of it able to secrete the bile. We know that the ovaries may be removed without injury to life. Now suppose that we did not know the function of the ovary; to how absurd a position would the foregoing mode of reasoning lead us! However, I am not writing on physiology further than in the consideration of phenomena.

The history of ague is, in all respects, very interesting, and especially as regards the spleen. Of all intermittent forms of disease, there is no one so remarkable as this common complaint; and it is curious to observe that it is, in some way or other, connected with the spleen, the physical condition of which it has the peculiarity of altering in a greater degree than that of any other organ in the body. It is well known that the spleen becomes enormously enlarged in many cases of ague; and it is also well known that the liver is frequently much affected in that complaint.

I had recently some very interesting conversation respecting ague with Mr. Curwarden, who has seen a good deal of it in Essex. He says that the ague-cake, as it is popularly termed, or enlarged spleen, is not so common now, and that ague itself is much less frequent in the neighbourhood; since, by the practice of boring, they have now generally obtained good water, which they had not formerly. He also says, that the enlarged spleen is most common, and, for the most part, restricted to those who have had either repeated attacks of ague, or who have had the complaint, locally called "long ague," for a very long time.

His experience does not lead him to think favourably of arsenic, as compared with other modes of treatment. Mercury is the remedy for enlargement of the spleen. He does not consider any previous measure, in all cases, necessary to the good effects of bark; but he thinks that its efficacy is often rendered more quick and certain by the previous exhibition of aperients; and especially by emetics. He could not, he said, connect any given degree of disorder as affecting the liver and spleen simultaneously.

On the occasion on which Mr. Curwarden was so kind as to favour me with his sentiments on this subject, I also met Mr. Kemble, a gentleman who had seen much of the intermittents of hot climates in Bombay. He told me that the liver, as we all

know, is there much affected; and the spleen also. The latter organ is there frequently inflamed; and abscesses are found in its substance.

Now, these facts point to a very decided sympathy between the spleen and the liver; and this, if there were no more direct connection, links the spleen in the general order of sympathies. When we observe the large column of blood poured into the vena portæ of the liver from the spleen*, we cannot shut our eyes to the possibility that the liver may be affected by the quantity of the blood derived from this source, and probably by its quality also. On the other hand, obstruction to the circulation in the liver must necessarily occasion turgescence in the vessels of the spleen.

I have seen many cases, apparently proceeding from disorder of the liver, where I have thought it probable that the disorder might be in the spleen, notwithstanding that the relief was obtained by remedies directed to the liver; and for this reason, that, although the biliary secretions have been manifestly disordered, and the countenance bilious, yet there has been pain, and even tenderness, in the region of the spleen. The curious, and, at present, inexplicable intermission of various disorders, must have some cause; and the probability is, that the cause is much more simple than we, in our ignorance, are inclined to imagine.

For almost all disorders assume, at different times, a more or less intermittent form; and it is curious, that, in general, the very same remedies are beneficial which produce such decided relief in ague. On the other hand, persons who have suffered much from ague have an intermittent form given to every subsequent disorder under which they labour. Mr. Curwarden mentioned to me a case of cancer in the breast which had gone into ulceration, in a lady, in whom the paroxysms of suffering occurred regularly every third day.

We know that urethral irritation will produce ague, especially in those who have resided in warm climates; and, although I myself have never seen that remedy necessary from such a cause, yet Sir B. Brodie says, that quinine is very beneficial in its relief. Now all these considerations point, if not to some common cause, at least, to some common law in the economy; and, could we understand it, we might at once unravel a variety of obscure dis-

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* Hippocrates, in his aphorisms, recognizes a connection between the spleen and dysentery, and also with affections of the mind.

orders; such as snyctalopia, hemeralopia*, and many others. I do not say that the veil which at present covers these affections will be raised by any investigation of the phenomena presented by the liver and spleen in various disorders; but I am well enough inclined to believe that they may be investigated with more chance of success than those of any other organs; especially if we combine with the enquiry, a particular observance of any organs, the alterations in the physical conditions of which we have an opportunity of investigating; which would, of course, embrace the alimentary canal, and, under some circumstances, the lungs also. When I speak of the physical conditions of these organs, I mean as characterized by the kind or quantity of air or food to which they may have been subjected. In a book written by Mr. Twining, on Diseases of the Spleen, as occurring in hot climates, the author observed, that "most patients labour under difficult respiration, impaired appetite, slow digestion, imperfect assimilation, despondency, inactivity, &c. In the absence of active pyrexia, the urine is pale and often copious. In the latter stages, there is œdema of the feet, and sometimes of the face. In the majority of fatal cases, the patient dies of dysentery or ascites." I may mention that this author's experience leads him to oppose the use of mercury in diseases of the spleen. I here leave the subject of the spleen: having said thus much, in order to excite your attention to the subject; and, in the mean time, we must be satisfied, I apprehend, in looking to the liver as connecting the spleen in the general class of sympathies.

PANCREAS.

We have little to say about the pancreas. Its function is important, no doubt, since types of it are developed as early in the animal kingdom as those of any organ; the stomach, perhaps, and liver excepted. It is rarely diseased. Mr. Abernethy mentions one case of it in a medical man, in whom the symptoms were indicative of sympathy with the stomach; vomiting being very frequent after taking food, when also the pain was most acute; the latter being probably owing to pressure from the distended stomach.

* There is a case of hemeralopia, mentioned in the Transactions of the College of Physicians (by Dr. Heberden, I think), as succeeding to intermittent fever.

The greatest relief from suffering was obtained by bending the body forwards on the knees, which might be supposed to relieve the pancreas from pressure.

THE HEART *PRIMARILY* CONSIDERED.

The sympathy of the heart with all parts of the body is very marked, and, in many respects, well known; and, indeed, when we consider that it is the prime and principal mover in the distribution of the blood, we can hardly imagine that it could be otherwise. Thus we find that all affections of the heart are attended, in different cases, by disturbance and irregularity of different organs; such as pain and confusion in the head; apoplexy, noise in the ears, flashes or pulsations in the eyes, general nervousness, and increased sensibility; oppression and dyspnœa, as regards the lungs; and sighing and yawning, as if the diaphragm sympathized; irregularity of the bilious secretion and costiveness, purging, or piles; disturbances of the urinary function; dry, harsh skin, with occasional sudden and profuse perspirations.

That excessive action of the heart, which we call palpitation, is also an occasional attendant on disorders of various other organs; as indigestion, congestion of the liver, and torpid bowels. Disorders of the urinary organs occasionally produce very disturbed conditions of the heart. One of the most remarkable intermittent pulses I ever felt, apart from organic disease, appeared to arise from an affection of the urethra. Pale, copious urine, and otherwise disordered states of that secretion, frequently accompany both functional and organic disease of the heart. The heart, too, seems to form a link in the chain of phenomena when fear produces so great and so sudden a flow of pale urine. Hysteric affections, in which the same thing occurs so commonly, are also attended by a very irregular condition of the heart's action. In many cases, however, this phenomenon is very complex; and, although the heart is evidently a link in the chain, it is not often easy to make out its exact relation, since sometimes it, sometimes the kidney, sometimes the skin or uterus, may be primarily affected.

The heart and arteries may be considered as parts of the same organ; since I suppose the idea that the arteries are mere passive tubes, or at least acting only by an elastic property, is now well

nigh abandoned. The sympathies between the different parts of this general apparatus for the distribution of the blood are highly interesting; and are nearly, if not entirely, the causes of the phenomena of the pulse; the observation of which, you know, is often of so much consequence. Mr. Hunter has treated of this subject with his usual acumen. Now, the various kinds of pulses are extremely difficult to convey by description; but a general view of them to help you to further observation may be useful. In the first place, we may state, that pulses differ in power; secondly, in their manner of evincing it; and lastly, they have certain peculiarities which may exist in all degrees of power; and therefore, for the purpose of our present consideration, may be regarded as independent of it.

In the first place, the power, as absolutely strong or weak, is the direct indication of the force of the heart's action; secondly, the manner as regards slowness or frequency; thirdly, the quickness of the beats, as distinguishable from the interval between them; so that a pulse may be frequent, that is, may beat 100 in a minute; and yet may not be, in the sense in which I have used the word, quick; or it may beat 70 in a minute, and be quick. The quick, sharp, kicking pulse, seems referrable to the heart; and all these states may be independent of any particular condition of the artery: but when we consider hard, soft, full, or small wiry, and some other varieties of pulse, we arrive at characters which evidently depend on the condition of the artery, and which appear to be sympathetically induced, sometimes by the condition of the heart, sometimes by that of the system; most commonly, no doubt, by both in conjunction. When the heart is oppressed, it would seem that the artery sympathizes with it, and this in states very opposite from each other.

There is a full, plethoric state of system, in which the heart appears, in its diastole or relaxed condition, to receive a large quantity of blood, and to expel it by a somewhat sluggish, yet effectual effort. In this state the pulse seems to expand easily, to help, so far as it can, the power of the heart, by giving the blood free ingress into the vessel. If any cause disturb this condition of the circulation, the heart, becoming more irritable, acts more frequently; and there occurs a different state of artery. There is still a large vessel, but it is not soft; there would seem to be a disposition to resistance to the circulation in the artery; and the pulse, though still full, is hard, and not unfrequently pulsates with

a sort of bound or kick Perhaps no state is more indicative of simple plethora than the one in question.

If the heart be oppressed in another way, it would seem that it does not largely relax; or it does not contract, so as completely to empty itself; and that, in either case, a less quantity of blood flows into the arteries, which accordingly diminish their calibre by contraction; and the pulse becomes small, and usually hard and wiry. If this state occur from debility merely, the same want of power felt by the heart seems to affect the contractile force of the artery; and the pulse, though small, may be soft, even so as to suggest an unnatural degree of this property. The first case is seen in inflammatory affections, attended with depression of vital power, as in some cases of peritonitis, and inflammation of the bowels; the latter, in cases where large quantities of blood have been lost, and also when the system is under any depressing influence, as sickness of stomach; and I think I have seen it from the influence of tobacco.

If the pulse be quick, in the sense in which I have used the term, it will be owing to the heart; but characters may be combined with the sharpness of beat which involve other considerations. Cæteris paribus, quickness is never a test of power; on the contrary, it may be always, with a careful adjustment of that consideration, be regarded as partaking either of debility, or of a state that leads to it. It is an evidence of excitement, as contradistinguished from power; but as strong parts may be excited, it is not always so sure a test of weakness, as of a tendency to that condition, from the effects of excitement, which has always a tendency to exhaust power. It is also true, that it is sometimes a direct evidence of weakness, as debility is very excitable; and thus, sometimes a pulse of a very weak system will really simulate strength, so as to make this, in some mixed cases, one of the most difficult distinctions in practice.

Now, here the sympathy of the arteries with the heart seems to me to afford much information, though I do not say that it will be an unerring guide; but whenever a pulse under excitement *simulates* strength, it is seldom hard; it has usually a softness not in keeping with the other phenomena which are observable. I have seen this state of pulse in erysipelas, and I suspect that it has often led to a pernicious abstraction of blood, from the fallacious character of strength which it exhibits. The truth is, probably, that the heart is acting with great excitement, but with

really little *vital* power; and the arteries yield to the impulse by a kind of consent of action—a sympathy accommodated to the actual, as distinguished from the apparent, strength of the propelling organ. I think, therefore, in determining the question of bleeding, I should, cæteris paribus, be much influenced by the hardness or softness of a pulse, concerning which it was desirable to determine the question of power, as suggested by any combination of strength and quickness of beat.

Suppose, for example, we had a case of idiopathic erysipelas, in which the progress of the disease, and the general condition of the patient, put the question of bleeding otherwise on a par. If the pulse were strong, quick, and soft, I should say try other methods of lowering the vascular action: if it were hard, or even firm, I would say bleed,—that is, as I would bleed in erysipelas,—of which I shall speak hereafter. Nothing, I conceive, can be determined with regard to the question of how much, in this state of pulse may be attributable to power, and how much to excitement, by a pulse glass, or any other mode of ascertaining the actual force of the heart at the time; because excitement will produce as great momentum at the time, and often more, than we witness in actual strength; just as voluntary muscles will, under certain states of excitement, evince a power of which, under ordinary circumstances, they would be incapable; so that we must not assume that *mechanical* force is a just indication of *vital* power. Impressions on the skin exemplify the ready sympathy between the arteries and heart, whether direct or intermediate.

Thus the reaction after cold, and the experiment with which I set out—that of placing the finger in hot water—proves the rapid consent of action between these parts. Blisters on the skin often produce effects, exemplifying, in a more or less striking degree, the ready influence exercised on the heart by impressions on the capillary circulation. You will find, in Dr. Whytt's works, a series of cases, which he records to shew the effects of blisters in *lowering* the pulse.

However, we must not refine too much in illustrating this sympathy. It is sufficient to shew that there is, for the most part, a very discernible sympathy between the heart and arteries, and that a careful consideration of either will generally assist in appreciating the real condition of the other. The sympathies of arteries, however, are exceedingly interesting with reference to their minute and ultimate divisions, those vessels in fact, which, as Mr.

Hunter says, are the modellers of the body, and on whose consent of action with the absorbents the form and bulk of parts essentially depends. Their sympathy with various states of the system, and with the arterial system in particular, are of great importance, as leading us to sound views, if they do not explain the deposition of tumors and other diseased depositions.

I shall therefore mention a few instances in which the heart and arteries are sympathetically affected; since, in any subsequent endeavour to explain why the minute arteries act in this or that manner, it will be a very necessary element in the enquiry, to ascertain any cause which can make them act in any way, so as to evince a demonstrable connection with any organ or organs. Now the phenomena already mentioned, in connection with the sympathies of the skin, shew that affections of the digestive organs produce unusual activity in the capillary circulation; because redness cannot take place without it. Redness is not essential to activity of the capillary circulation; but activity of the capillaries is essential to redness. I mention this, because hereafter you will find it an important distinction.

Affections of the heart, especially through the mind, produce certain phenomena in the minute vessels, of which blushing is an instance: and therefore anything which affects the heart, *may* affect the capillaries also. This brings us again to the sympathies of the heart itself, which we see exemplified in almost every disease of every organ; but as this has been pretty fully considered in different parts of the foregoing observations, and will be again mentioned with the subject of joints, I need not repeat them here, nor anticipate the application of the several phenomena. The sympathy of the heart with the mind will, however, be somewhat more fully considered when the mind is the subject of discussion.

UTERUS, PRIMARILY CONSIDERED.

No organ more strongly demonstrates the recognition which takes place between all parts of the body than the uterus; since there is no one part of the body with which it does not sympathize.

The innumerable forms of hysteria which, in different persons, simulate almost every complaint with which we are acquainted, substantiate this position. You must not conclude, however, that all cases of hysteria originate in the womb. I am well convinced

the fact is far otherwise, and that the womb, in a great many of them, is secondarily affected; the primary disorder being in the stomach, liver, or bowels, or in all these parts, to affections of which, the habits of women render them so obnoxious. The womb, nevertheless, is very commonly deranged in its functions, and, as it is subject to disordering influences, in many cases is, no doubt, primarily affected. We find that disorder of the womb will produce sickness; loss of appetite, or a voracious or fitful desire for food; purged or costive bowels; great flatulency; torpid state of the liver; disturbed condition of the kidney, sometimes evinced by scanty and thick, but more generally by copious and pale, urine; disturbance of the mind, melancholy and foreboding, or high spirits without sufficient cause, torpor, or even fainting. Palpitation of the heart, oppression about the chest, and sighing, are frequent concomitants of hysteria. I have seen a woman with symptoms exactly resembling those of stricture of the rectum, and then those of stone in the bladder, which were dependent on the condition of the uterus.

Cramps of muscles, pains in the joints and limbs, are also not unfrequent in affections of that organ. Sydenham, alluding to the general symptoms of hysteria, says, that Proteus had not more shapes, nor the camelion so many colours. Constant cough; pain like a stone passing the ureter; acid and gaseous eructations; vomitings of green bile; "Anger, jealousies, suspicions, and other passions; a wavering and unsettled state of mind; constant to nothing but inconstancy; salivation; night sweats; may be enumerated, amongst a variety of others, as symptoms of hysteria."

As the symptoms mentioned shew, in reference to the respective parts, the universal sympathy of the uterus, I need not increase the catalogue. I would, however, observe, that the fact of the uterine affection not being primary, in many cases, and not existing in a distinguishable manner in others, is a very important circumstance, as helping us to the explanation of hysteria; and if, with this, you recollect that hypochondriasis in men, which is often connected with deranged liver or stomach, often presents many of the same symptoms that hysteria does in women, you will have all the elements necessary for the consideration and adjustment of the real influence of the uterus in the phenomena of hysteria; and which I think you will find, for the most part, owing to primary conditions of disorder in some other parts of the system. In con-

nection with the sympathies of the uterus, it is very important to recollect, that many of those disorders which accompany pregnancy do not exclusively belong to that condition. In short, I know of none of what may be called the symptoms of pregnancy, as regards other organs, which may not attend other conditions of the uterus; and this suggests, what I think experience abundantly justifies, that many of the severer sympathetic disturbances which accompany utero-gestation, are, in fact, not so much to be referred to that state, per se, as to a disordered condition of the system; which gives rise to sympathetic disturbances, often relievable, but generally left to take their chance, as it were, on the supposition that they arise from natural, and therefore uncontrollable, sympathies in the individual.

I have known a lady suffer constant sickness in pregnancy, which, on a subsequent occasion, has been entirely removed by attention to derangement of organs on which the sympathetic disturbance was thus proved to depend. This, truly, is a subject falling more under the province of accoucheurs; yet surgeons are occasionally consulted where there is any idea of organic affection, either of the uterus, mammæ, or rectum. Cases of this description have presented to me some curious facts in relation to the sympathies of the uterus, as throwing some light on the preceding observations. I have mentioned a very remarkable case already, in speaking of the sympathies of the alimentary canal, simulative of pregnancy. But I could mention a variety of instances, shewing how disorders of the uterus have occurred, as sympathetic with other disorders of function; and which satisfactorily explain, why measures directed to other organs frequently succeed in correcting deranged conditions of the uterus, in which steel, myrrh, aloës, and other remedies, supposed to have more direct effects on the uterus, have failed. In many cases, and I think in almost all of deficient catamenia, the skin is more or less affected; and applications to it, either by means of sudorifics, taken internally, or by warm baths, prove very successful emmenagogues.

In some physiological essays, written by Dr. Stedman, some seventy years ago, there is one on menstruation; in which the relations of the skin and uterus are dwelt on as observed by Sanctorius, Dr. Friend, and others. Indeed, Dr. Friend proposed a theory of menstruation, which made it depend on a relation it was supposed to bear to the functions of the skin. I merely mention this circumstance to impress the fact of the consent of action ob-

served between these organs. I have, however, already sufficiently adverted to the sympathies of this organ; and the multiplication of their illustrations here is unnecessary. The fact that I would impress now, and further I cannot conveniently enlarge, is, that most cases of disordered uterus depend on other parts having been primarily disordered; and that the correction of such disordered functions, whether of the alimentary canal, liver, or other parts, renders many cases, otherwise wholly intractable, not only very curable, but also with the greatest facility.

TENDON; BONE; AND STRUCTURE OF JOINTS GENERALLY.

I have placed these together; because all that is necessary to say with regard to any of them, applies more or less to them all. All parts whose functions seem to require what is called low organization, are chiefly characterized, either by the absence of red blood, or by the diminution of that sensibility whith which parts are ordinarily endowed. Now Mr. Abernethy, and, I believe, Mr. Hunter also, observed that parts most disposed to suffer in general disorders of the animal œconomy, were parts of least life and most susceptibility. The structures here considered fall under this description; and we certainly find that they are particularly prone to become disturbed by general indisposition. Common cold, gout, rheumatism, diseases of joints, scrophula*, are all so many familiar examples of this tendency; whilst different cases shew the sympathy of the structures in question with various organs; one with the stomach, another with the liver, a third with the skin, or with all these in conjunction, and so on. The most important thing, however, to remember, is, that that sympathy which is glaringly demonstrated in peculiar diseases, as gout, &c. is not less real in affections of joints usually considered to result from "common inflammation,"—that is the important fact to be impressed on you.

Rheumatism sometimes presents us with a fearful illustration of the sympathy of the heart with these structures; since a fatal transition of the diseased action of the heart is by no means a very

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* Mr. Hunter says, vol. i, p. 346:—"A gentleman had an anchylosed knee and ankle-joint from scrofula; and he was always deaf at the full of the moon, except in autumn, when his sores discharged plentifully."

infrequent occurrence. That of gout to the stomach is also well known. There is a very curious case related by Dr. Wilson of Kelso*, in which a man had gout in his foot, which gradually left part after part, until it reached his stomach; when a violent vomiting of green matter was attended with immediate and complete relief. The universal derangement of the digestive organs in affections of bones, joints, &c. is so well known, that it need only be mentioned. In diseases of bone of a chronic kind, nothing like adequate attention has been paid to the mutual sympathy between this structure and the general system; but the march of improvement has, I think, begun; and we shall find that general measures are more regarded, and local less, even in diseases of bone. To shew the present state of science as regards this subject, I may mention a case. A woman had for a long time a violent pain in a particular spot in her tibia; it was thought that matter had formed there, as such cases have been accompanied by such symptoms.

So far, so good; but the surgeons who saw her proposed to trephine the head of the tibia—an operation of which, in one's own person, I suppose, we should like to be well convinced of the necessity. Now all this might have been necessary; but now let us consider the remaining part of the case. The woman was exceedingly out of health: she distinctly stated that her health had been impaired before the occurrence of the pain, which I myself made a point of communicating to one of the surgeons; and, lastly, this was in a hospital. Now, I would ask, would it be possible, bearing in mind the sympathy of bones, &c. with the general health, or even the general announcement of the principles of Hunter and Abernethy,—nay, would it be probable, that any men could, in such a case, and under such circumstances, entertain such a proposition?† I know I was surprised and extremely vexed at

* On Morbid Sympathies, &c.

† Mr. Stanley gave, this year, some very good Lectures on Diseases of Bone, at the College of Surgeons; but they might be regarded more as the natural history of such diseases than as any attempt at investigation into the pathology of these diseases, *strictly so termed*. Mr. Stanley, I hope, will yet pursue this subject, by an enquiry into *the various conditions* of the system, by the action of which the various changes of structure are produced; otherwise, the facts which he has collected, with an industry highly commendable, will scarcely repay his labour, as regards the light which they will throw on the treatment of disease. They are rather to be regarded as the natural history of diseases of bone than as elucidations of their pathology: but of the relations of morbid anatomy to pathology, I have already spoken; see Discourse I, p. 9, et seq.

the time ; but not a little rejoiced to find that no persuasion could induce the woman to submit to the operation. The rest of the case may be related in a few words ; namely, that she recovered without any operation at all. In short, every thing I see around me convinces me that there is no sustained effort to unravel the laws of the connection of all parts of the body with each other ; and this impels me to insist, so far as an humble individual can, on its study—not only as necessary to the progress of medical science, but as a *duty* to those who profess it.

Affections of bones, joints, &c. as connected with the urinary organs, are well known ; and the gonorrhœal rheumatism is a glaring example of this sympathy. A very important sympathy is here also unfolded, namely, that of fibrous structures ; as tendon, ligament, &c. with mucous membranes. Any affection of the membranes lining any of the canals of the body, is competent to affect the joints, tendons, fibrous membranes, fasciæ, &c. ; and the sympathy is reciprocal : but disturbances of the mucous surfaces of the alimentary canal, or the urinary organs, more frequently affect the fibrous structures,—as of the head (dura matèr), and of the heart (pericardium), besides ligaments, fasciæ, and the structure of joints,—than the fibrous structures affect the mucous. So much, however, must necessarily be said in a subsequent volume, in connection with these important parts, that I need not enlarge further on their sympathies.

MUSCLES.

I have already mentioned some sympathetic phenomena of the muscular system, in speaking of cramps, convulsions, St. Vitus's dance, and tetanus. In rheumatism, a disease which exemplifies sympathy with different organs in different cases, it is well known that the muscles are very generally affected ; sometimes by a loss of power, and by a refusal to contract ; at other times, contracting involuntarily with great pain. I need not enlarge on these subjects in this place ; but shall mention one or two familiar occurrences, shewing the sympathies of these parts in a somewhat different manner, in certain conditions of the system. The most simple primary affection of the voluntary muscles, and it is of them that I now speak, is fatigue ; and, of this condition, we find most other parts of the system affording recognition. The heart beats less powerfully ; the diaphragm acts more slowly ; and, as it were

from necessity arising out of those results, the lungs also. A very interesting and important condition of the muscular system, as helping us to discover what we have often great difficulty in detecting, is an apparently sound state of health, as distinguished from real vigour—a discrimination which we cannot make, either by the feelings of the patient, or by observation of the functions of any other organs; but which is, nevertheless, often shewn by the muscular system, in a very obvious manner, both in its nature and (in a case of accident or disease) its consequences. This state is well known in animals; and to many in regard to man; and is what is usually termed condition. If the body be in a high, real health, and all its functions proceeding with vigour, the muscles are very firm; and, when they act, become extremely hard and unyielding: we find, too, that they act with a vigour much more sustained, as well as increased; and that, in this state, they are very good general indications of the state of the vital powers. Diseases seldom occur under these circumstances; but accidents very often: and, notwithstanding that they frequently involve injuries of a very extensive nature, we seldom find any other measures necessary than tranquillity; and, perhaps, some diminution of the circulating fluid.

Many circumstances prove the connection of this condition of muscles with vigorous health. In pugilistic contests, we have often seen the very severe injuries which the body sustains in various parts: a man has stood up for more than an hour, with very short intermissions, perhaps of one minute, seldom exceeding a minute and a half; and, after receiving a vast number of severe blows, and having been carried off with his powers quite exhausted, and sometimes senseless, he will often appear again, in a few days, having, to all appearance, very little the matter. The contrary sometimes happens; and a pugilistic contest proves fatal to one of the combatants: but this is equally instructive; for, besides that such an event is extremely rare, it almost always happens that it is in what used to be called a "turn-up fight," that is, a fight got up on the spot; or else in cases where the sufferer was of careless habits, or had not undergone the requisite training. The trainers of race-horses, also, know very well the effect of the general health on the muscular system, and the sustained vigour which it gives to the wind and speed of the animal. The muscles of all wild animals which are almost always in condition, and which are subject to scarcely any disease but old age, are remarkably distin-

guished from those of the same species in domestication. They are always firmer, and redder; and require, as we know, much longer keeping after death to render them tender. In many cases, if you feel the muscles of a man who has some indication of ill health, of which his feelings do not apprize him, you will almost always find them soft and flabby, and that he is easily fatigued.

I have often been surprised to see, in convalescent states, how very soon this condition of muscle alters under the usual treatment; such as air, exercise, and more nutritious food. A week will often make a difference, which it is impossible to conceive can result from organic differences in the muscles, but which must be referred to an increased vitality given them through the nervous system. We have a proof of this in cases where muscles are renewed in their vigour by a single meal, which shews the ready sympathy they manifest with the condition of the nervous system.

The diaphragm is an example of extensive spmpathy in a single muscle. Its ordinary alternate action, with the abdominal muscles, is a beautiful example of consent of action in the performance of respiration. Its participation with the heart and mind in sighing, sobbing, &c. is well known. This muscle, one of the most interesting structures of the body, presents, indeed, a vast number of facts for useful reflection; but, as I am not teaching physiology generally, it would carry me away from my subject to enter into them.

The sympathy of muscles with the parts with which they are connected is highly interesting. How wonderful that the laws of volition should be constantly modified for the safety of the individual. If a part be broken, bone or tendon, that Will, which held the muscles in subjection to its mandates, and which acted on them with a celerity to which we know nothing analogous but electricity, is no longer capable of exerting its power. The will, indeed, may act, but not so the muscle: and in other cases we observe the converse of this; the muscle will act, though it be ordered by the will not to do so. This we see in dislocations. Nothing prevents the bone being replaced but the muscles: the patient tries with all his power to relax them; but they hold the dislocated bone with ungovernable pertinacity. Here is sympathy, indeed; the muscle seeming to sympathize with injured parts, and to exert a specific influence independent of that power to which it is usually subservient. Now all this I would have you think on at leisure by and by. Mr. Hunter observes also that muscles shrink in the

neighbourhood of a diseased joint, and we say that it is because they are not used. This may be, *in part*, the right explanation; but, as Mr. Hunter observes with his usual acumen, if this were the case, we should have the muscles of the opposite limb, when the patient is at rest, shrink in the same manner; which we do not find to be the case.

CELLULAR TISSUE.

The connecting medium between all parts of the body, by means of that elastic form of animal matter which we find between the skin and muscles, and between different muscles, and which we call cellular tissue, has peculiar properties, many of which range themselves most conveniently in the catalogue of sympathies. The cellular tissue, like many elastic substances in animals, is not very sensitive: it has no functions under ordinary circumstances but those of connecting all parts with each other; and, although various circumstances shew how speedily it sympathizes with other parts, yet, so long as the effects are strictly confined to it, other parts do not shew much disposition to sympathize with it. Thus, various tumours grow in the cellular tissue without producing disturbance; even cancer may be there for an indefinite period, and yet not produce reaction.

The phenomena of dropsy shew the readiness with which the vessels of the cellular tissue sympathize with other parts: yet how little reaction a very great disturbance of this tissue produces. This is partly, perhaps, from its elasticity, and partly from its not being a very sensitive structure. Nevertheless, we cannot say that cellular tissue is not highly organized; for, in truth, it shews plenty of evidence of abundant vascularity. Now the foregoing remarks are made chiefly in reference to the functions of the cellular tissue as a connecting medium—a function, the integrity of which is highly important to the ease and comfort of the various functions of the parts which it connects—but still it is a part whose functions can be interfered with, with *greater* impunity than those of any other structure in the body.

In this respect, cellular tissue presents a situation where the various products of diseased action may be deposited with less injury to the animal than any other; and accordingly we find that it is by far the most common situation for such depositions. Now

this consent of action in the vessels of the cellular tissue, we have great difficulty in explaining in any other way than by referring it to the sympathy which it possesses with all parts and with the whole system. When we consider the different forms of inflammation, we shall find that a great variety of them have their principal seat in the cellular tissue; and that, in many of them, the cellular tissue not only allows a convenient situation for the diseased action, but, by a process of thickening, prevents the inflammation from becoming diffused, as it would do were such thickening not to take place. We see this in common phlegmonous abscesses, in boil, and less frequently in carbuncle. The effect of this absence of thickening, or at least an accompanying circumstance, is seen in the diffused extension of erysipelas.

If we examine into a very difficult part of surgery, namely, the origin, growth, and nature of tumours, of which the variety in form, character, and progress, is almost endless, we shall find that they generally commence in the cellular tissue; and, although we cannot say that this is a law, until we explain the exceptions to it which we observe, yet these exceptions may, as far as regards the ordinary observation of diseased depositions, be truly regarded as variations from a general rule. Fatty, fibrous, encysted, and a great variety of other tumours, evidently commence in the cellular tissue; and many of them, though they arrive at a great bulk, are seldom seen to affect any other structure. Even malignant tumours, if examined at their commencement, are almost invariably seen to commence in this structure; and, in thickening of canals, the same circumstance is generally sufficiently observable.

It is not very often that we have an opportunity of observing this; but I am certain that I have seen thickening of the intestines, in which neither the muscular nor membraneous structures seemed to have as yet participated. Neither are we necessarily to infer, because we see a glandular structure changed, that the disease may not have commenced in its cellular tissue; since there is no part without this connecting medium, and since the disposition to diseased deposition in it seems so common and so universal. Now all this is, in a pathological point of view, extremely important; because,—if we see that there is a law, or if we see that there is a disposition for diseased actions of the system to deposit various kinds of matter in different parts of the body, and if we observe that this usually commences in the cellular tissue, or, in other

words, that there is a certain consent of action in the vessels of cellular tissue to take on the business of such diseased depositions, —we shall arrive, not only at a more enlarged view and scientific treatment of tumours, but we shall readily understand how it is that certain improved conditions of general health are accompanied by the removal of such tumours.

Of such occurrences, many examples have occurred under my own observation; and what has tended to impress the fact more strongly on my mind, is, that many of these tumours have been of a nature, I will not say cancerous, because I had not the opportunity of examining them by dissection; but this I will say, that several of them were such as I believe no one would have hesitated in pronouncing to be true scirrhus, so far as the most careful and accurate examination of the cases could enable any one to determine. Of these I have met, in the course of sixteen years, with about six or seven cases. I have not, unfortunately, kept notes of them; but they have all been, more or less, similar in their history. They have occurred in the breasts of women who have been about the age when the catamenia cease; they have been extremely hard, have existed for a considerable time, and have begun to be painful. Operations have been proposed and assented to; when, on preparing the patients by putting them in good health, the tumours have undergone some change which has postponed the operation; and, in the end, the tumour has gone away. In the two last cases which I saw, I so far predicted the result as to say, that, notwithstanding I had proposed the removal of the tumour, yet I had seen apparently as genuine a case of scirrhus as those under treatment, go away on the correction of the general health. There was a woman, last year, in the Dispensary, whose case I have lost sight of, in whom there was a tucking-in of the nipple, and every other symptom of carcinoma; but she appeared to have some affection of the heart. This put the operation out of the question. During her treatment, which was chiefly directed to tranquillizing her circulation, the tumour became loose and smaller, and the nipple began to assume its ordinary appearance; but I have, for the present, lost sight of the case. On this point, however, you will hear more to the purpose, when tumours are the subject of a more practical discussion. I here only say as much as is sufficient to impress the fact, that, in certain disorders of the system in which tumours are deposited, the cellular tissue is the nidus in which such depositions usually take place; and we cannot

understand why this should be the case*, further than by considering that there is a general consent between the vessels of cellular tissue and the state of the system generally. This seems, in the absence of a better place, to range itself naturally under that correspondence between all parts to which we refer the phenomena of sympathy. The sympathetic phenomena, referring to the absorbent vessels, present us with much useful matter, in connection with some of the foregoing observations; but, were I to enter into that now, I could scarcely help a repetition hereafter, which I am anxious to avoid. The phenomena of sympathy can never be fully treated, unless in a work expressly devoted to it; except they be interwoven with the discussion of the history, treatment, &c. of different diseases. This I shall endeavour to accomplish so far as is practicable: in the mean time, those mentioned may be sufficient.

BRAIN.

As the brain and the nerves (the whole of which are connected with it) are the sources of all our sensations; and as the former, by means of the nerves, holds communication with every part, of course its sympathies are well marked, and universal. The sympathy of the brain would alone require a very considerable space for its full discussion; but what is necessary to an elementary view of the subject, may perhaps be comprised in a few pages. The brain may be said to manifest two kinds of sympathy, very different in kind; the one common to all parts of the body, and therefore what may be called its physical or corporeal sympathy; as exemplified in various kinds of pain, increased determination of blood, bursting of its vessels, inflammation, and so on. The other, that kind of sympathy which consists in the derangement of its functions, as the organ of the mind; and which may, in contradistinction, be termed its moral or psychological sympathy. Now, as regards the former, the fact of the head becoming variously disturbed by different disorders of other parts, is so familiar that it is not necessary to say much on that point. The physical sympathies of the brain are demonstrated like those of other organs; that is, by pain, or some other alteration in its sensitive functions.

* This subject will be renewed in connection with the consideration of the law of inflammation.

In this class I would include pain, giddiness, throbbing, noise in the ears, illusory vision, and so on. Now enough has been said on this kind of sympathy in connexion with other organs; and I would here only connect with it one important fact,—namely, that disorder of the brain, thus arising sympathetically from affections of other parts, but more especially from the digestive organs, and which was originally unattended by any organic change, will, in many cases, if the disturbing influences be continued, ultimately end in alteration of structures. Now this is a very important fact to be remembered; and although there can be no doubt, that, in cases where the brain is diseased, and the chylopoietic functions are found much disturbed, the brain may sometimes be primarily affected; yet it is at least equally certain, that in many cases the cerebral affection is secondary. This, however, is a point which does not admit of philosophical demonstration by the mere narration of cases; although the observation of them, to my mind, affords nothing less to the individual in whose experience they occur. For where we observe repeated recurrence of disorder of the chylopoietic viscera constantly relieved by the most simple attention to their functions; where the disorder only recurs on the recurrence of the causes which produced it; where at length cerebral disturbance becomes superadded on the later attacks; and where the disturbance, beginning in common headache, then affects the external senses, and subsequently terminates in paralysis and structural disease;—I know not how we can resist the conviction which such a series of phenomena forces on us. I have already mentioned a very striking case of this kind in illustration, in connection with the liver.

Every one knows that disorders of the various viscera affect the head in the modes already alluded to; and that a plethoric condition of the system, generally, or of any particular viscus, is especially apt to occasion cerebral disturbance. It is equally true, though perhaps not quite so trite, that an opposite condition of the system will, in many instances, produce very simliar disturbances in the head. Thus, too copious an abstraction of blood, either by art or accident, is very commonly attended by throbbing and other derangement of the cerebral circulation. In tardy convalescence, and also in the early period of convalescences, which are satisfactorily progressive, we frequently have evidence of the same disturbance. I had a very interesting case of this kind in a gentleman, who had been confined to bed about three weeks, in consequence of

a disorder connected with his urinary organs, occurring at a time when he was out of condition. On his recovery from that disorder, he was troubled by symptoms which, under other circumstances, would have been as alarmingly as they were closely simulative of imperfect amaurosis. I told him that, in my opinion, there was no reason for alarm, and that he would find, that as he regained his strength, which he would, now that he returned to exercise, better diet, &c. his amaurotic symptoms would subside; but that perhaps it would be satisfactory to see if a different view could be taken, and that, therefore, it might be more satisfactory to have a consultation. In this consultation, although the general correctness of the view which I had taken of the case was admitted, yet there was, on the part of the gentleman with whom the consultation took place, a disposition to attribute something to a slightly vascular condition of the membrane lining the eyelid; and a wash and some other local application recommended. As I could not participate, in any way, in this view of the matter, the patient declined doing anything of this kind: and the result of the case proved the correctness of the opinion which I had entertained; for, as his strength improved, the amaurotic symptoms retired, as had been predicted.

As the exemplifications of this sympathy will so frequently present themselves, and as they are already so well, perhaps even popularly, known, I will say no more of them here, but proceed to consider the sympathies of the brain as the organ of the mind,—the sympathy, in fact, of mind and body.

This is a very important subject, and one which has been by no means cultivated as it ought to have been, but which promises practical results of the highest interest. For that the mind generally sympathizes with the body, no one will deny; and the two following propositions appear scarcely less demonstrable. First, that any function of the mind may sympathize with any part of the body; and, secondly, that, notwithstanding this, certain parts of the mind exhibit a preference, at it were, in their sympathies with different parts of the body, and this reciprocally.

This is exactly what happens between organs generally; and I am desirous of impressing the fact, for reasons which will appear as we proceed. For example, then, suppose we take any two bodily organs; say the uterus and kidney. There is no part of the body which may not sympathize with either; but they each affect some parts much more frequently than others. Thus, the uterus

affects the stomach much more frequently, perhaps, than any other organ; and the same may be said of the kidney: although there is no organ which may not occasionally be affected by both of these viscera. So with the mind*. Disease of any organ may disturb the mind; and, for aught we know to the contrary, in any way; and again, disorder of the mind will disturb any organ: in one, the liver; in another, the stomach; in a third, the bowels; and so on. But, notwithstanding this, it is very evident that the mind disturbs some organs much more frequently than others. Of this, the heart may be cited as the most familiar example. Then, when disturbance appears to occur primarily in bodily organs, it affects the mind in different degrees. Derangement of the biliary apparatus affects the mind with much greater certainty than derangement of any other organ. I speak this considerately, and not without due attention to the powerful sympathies of the stomach and uterus more especially. The hypochondriasis and melancholia of the ancients point very decidedly to this connection, and daily observation furnishes hundreds of additional examples of its its truth. The next proposition I wish you to consider, is this: If the mind has reciprocal sympathies with all parts, and yet exhibits different degrees of excitability with reference to, or in connection with, particular organs, why may not different *parts* or *faculties* of the mind exhibit different preferences in their sympathies with different parts of the body? If this be so, it is clear that we have hitherto limited our attentions on this subject to a very coarse generalization. Now, analogy directly favours this view of the mental sympathies, because it is unquestionably demonstrable in respect to corporeal organs.

Let us enquire whether we have any facts bearing out or justifying such conclusion.

Now the heart is affected by the mind, doubtless; but is it not most remarkably (we will not say frequently, because that may or

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Mr. Hunter observes,—"Strong affections of the mind will produce involuntary motions, even of those parts commonly at the command of the will." He also observes, "I suspect that particular parts may sympathize more readily with the mind than others." p. 329. And again he observes, at p. 359, "Indeed, there is not a natural action, whether voluntary or involuntary, that may not be influenced by a peculiar state of the mind at the time; and every *particular* mode of the mind has some parts that are more *readily* influenced by it than others." Palmer's edition, vol. i.

may not be in point) affected by the passions, as love, joy, anger grief, and so on? Will any man say that the heart is equally, or as demonstrably, disturbed by the intellectual functions? But neither the *absolute* influence of the passions on the heart, nor *their* relative power, as compared with the intellectual functions, will be doubted. It remains, however, to be observed, that the passions themselves have something in common, and something peculiar. We assert that different passions disturb the heart in different modes, notwithstanding that we may be unable to describe these modes in detail, because we evidently perceive *that they are not the same.* It is one thing to see that things are not identical, and another to convey in what their differences consist. Nothing, for example, can be more different than the effect produced on the heart by fear and anger. Anger increases the action and power of the heart; fear depresses both. Phenomena, the same in kind, but differing in degree, are also produced by joy and grief. Joy tends to raise the heart's action; grief to depress it.

Now we are too much accustomed to think of all these passions as the act of one organ, comprising the whole under the general term of mind. This is all very well, if we recollect that this word mind refers to an assemblage of functions, which, whatever may be the depth of our ignorance, we at least perceive to be very different from each other. No greater difference is conceivable than that between joy and melancholy, hope and anger, despair and benevolence. Hearing is not more different from seeing, nor smelling from tasting, than the different functions and feelings are from each other; and, as the mind is thus made up of a set of functions, different in their nature, or, at all events, extremely different in their operations, it seems not only reasonable, but in fact probable, that their sympathies will at least present the *ordinary* varieties in their operation. Now, if we commence with a grand division, as it were, of the mind, first into those functions which we call the passions, then into that assemblage of faculties denominated reason, we begin at once to obtain a glimpse, as it were, of different manifestations of mental sympathy. The passions are common to animals; the rational faculty is peculiar to Man.

Love, joy, grief, &c. are common to both: comparison, reflection, judgment, the special attribute of Man. Now it will be found, on examination, that the sympathies of those propensities common to both are most remarkable in respect to organs with which both are also endowed in common; for, although the pas-

sions do, at different times, most certainly disturb every organ in the body, yet it is equally clear that they disturb some organs *more* than others; and, on examination, it will be found, I think, that they disturb those organs most frequently in which we can discover no difference between Man and animals; such as the heart, lungs, liver, kidney, and perhaps spleen.

The physiological characters of these organs are the same in in both cases; but, when we consider the alimentary canal, we find very interesting differences. They have, it is true, several things in common. Their relation to the body is, in a word, the same in both; their correspondence with the mind presents, as it appears to me, some interesting peculiarities. The alimentary canal in brutes seems chiefly allied with their passions. In Man, this is also, to a certain extent, equally true; but it is also, in a very especial manner, connected with his rational faculties*. Conformably with this view, we find that the animal propensities in Man sympathize most readily with his mere animal organs, and that his reason sympathizes most markedly with his digestive functions. Now it would be only in conformity with this view, if we were to find that particular passions affected particular organs more commonly than others; and, for my part, I think that it is so. Anger certainly most readily affects the heart, perhaps also violent grief; sorrow (by which I mean grief, moderate but sustained), the liver; fear, the kidney; and so on†.

Now this investigation is very difficult; but I wish you to consider it as part of a more analytical examination of these matters, with a hope of getting useful practical results. If we proceed to the observation of the mental faculties, we perceive, I think, similar sympathetic connections between them to those which we observe between other parts; that is, that the reasoning powers and the passions sympathize generally, but that there are considerable differences in the readiness or in the manner of their manifes-

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* See Remarks on the Unity of the Body, art. Brain, where this point is more fully considered.

† "Fear often brings on a flow of pale urine."—Whytt, page 134. So Hunter, vol. i, page 329—"Fear will produce actions of involuntary parts, as purging, discharge of urine, &c." Whytt also observes, in saying that we know not how blushing occurs from mental emotion—"Sufficient it is, that we know from experience that the *several* parts of the body are variously affected by the *different* passions of the mind."—Works, page 56.

tations. Ambition, for example, excites, and in a manner sustains, the energies of the reasoning faculties, for a time in an indomitable continuity of action; joy, on the other hand, rather opposes the severe exercise of intellect, whilst grief cripples it, and renders it almost incapable of exertion. Another influence, equally remarkable, yet extremely different in kind, and perhaps of all others most salutary, is that exerted by benevolence on the reasoning faculties.

It has neither the excitement of ambition, the idleness of joy, nor the gravitating tendency of grief. The calm peace that an habitual kindly feeling diffuses over the mind is peculiarly favourable to the exercise of our intellectual faculties. It produces a steady, forward movement, which not only allows of salutary alternations of rest and labour, but renders both equally sources of enjoyment. In thus tracing some of the links which form the chain of sympathy between mind and body, and between certain qualities of the mind with each other, I wish to impress that it is not a mere matter of ingenious or interesting speculation; neither is it at all connected with any metaphysical subtleties. I only wish to speak of things: you may call them functions, manifestations, sentiments, propensities, faculties, or what you please: I care not what they are:—they are things, occurrences, observable phenomena, which exert a most important influence on the body, the diseases incidental to which it is alike the business of my life to study, and my profession to relieve, and which, therefore, it is necessarily of great interest to be able to unravel to the utmost of my power. The means of relieving diseases by sympathetic influences, or the discovery of these influences in their causation, can be obtained only by ascertaining the laws of their operation. It is certain that they have laws; and it is equally so that we are in the very infancy of our knowledge in regard to them; whilst the very little that is known renders it probable, and in my mind certain, that an increase of such knowledge will materially improve our knowledge of the treatment of disease.

But to return to the sympathies. Nature, I think, would not have unfolded so much, nor have given us such a range of interesting, beautiful, and obvious phenomena, if there were any better mode of studying the phenomena of the body. It is our duty to observe these phenomena with our utmost vigilance, because all analogy, furnished by the experience of other sciences, shews that we shall be amply repaid.

The general sympathy of the mind with the body has been

already mentioned; but the examples of it would be but a host of truisms.

We require to go beyond the general fact, and to get at something like a knowledge of the various organs, whether bodily or mental, which are the sources of its exemplifications. I shall, however, reserve the few words which I can add on this subject at present to the conclusion of that section which has for its object to lead you to some of the applications of the phenomena of sympathy.

DISCOURSE V.

CONCLUDING REMARKS ON SOME OF THE USES AND APPLICATIONS OF THE PHENOMENA OF SYMPATHY.

In the few illustrations which I have given of the phenomena of sympathy, you will have already acquired some general notion of their importance; but you will probably have perceived but little, either of the extent or mode of their application. This cannot be entirely supplied by the remarks* which I have to make at present; since the range of influence exerted by the sympathies, whether they are regarded as manifestations of health, as indications of disease, or as hints from Nature as to how we should set about relieving it, can only be wrought out of a careful study of all the phenomena of a living body.

In anatomy, we see arrangements admirably adapted to the purposes they are designed to serve; and, from a natural, and in-

* The subject of sympathy demands a work exclusively devoted to it. It is far more important than those who have not given the subject much reflection can reasonably be supposed to perceive. But the work would necessarily be a thick octavo volume at least; and would probably not pay its expenses, unless undertaken by some one of very high reputation. The periodicals, however, might, I should conceive, take it up with advantage; and, although I would not undertake the whole thing, I would be a cheerful contributor. The work should be conducted on an inductive plan; so that, whether it produced any thing directly or not, it should be a real basis of further enquiry. It should embrace and commence with the sympathetic phenomena exhibited between any two separate existences of any kind whatever, and then proceed to the enumeration of those manifested by the various parts of the same individual. When the whole of such phenomena were brought together, including alike, corporeal, sensual, and mental, then those circumstances which they, or any of them, possessed in common, should be stated, with the exemplification in detail; nothing being assumed, in this primary classification, but what was obviously true. If this led to the development of any law—well; if not, it would furnish, I conceive, the sound pabulum for further reflection; leading to the next point, the physiology of sympathy, if the foregoing enquiry had not indeed sufficiently developed it; for the proximate use of phenomena is one thing, the law out of which they arise is another.

deed irresistible, analogy, we infer that the same excellence prevails in structures which are beyond our power of unravelling, as also in functions the nature of which may be beyond the reach of our perceptions.

In the present limited state of our knowledge, we perceive a harmony and adaptation, in many instances, that is very intelligible to us. Thus, many of those relations which the eye has to light, the ear to sound, the lungs to the atmosphere, are clearly intelligible. It is equally demonstrable, that things which are really useful to us are contributory to our pleasure, and that excess is hurtful; that not only, therefore, is the supply of our wants secured to us by proper adaptation of various organs to our necessities, our localities as individuals, and to external nature, but that these wants are, in all animals, made vehicles for enjoyment; that this is not only true of Man, and of the animals most nearly allied to him, but that it is equally the case with all animals, so far as our perceptions enable us to form any idea on the subject.

When we reflect on the accomplishment of such objects, and the prevailing benevolence which characterizes them in such countless millions of every variety of shape, form, and habit, as the animal kingdom presents to us, we are quite lost in wonder; and when all our feeling of this kind is, as it were, exhausted, and we begin to study matters a little more in detail, we are surprised to find that every thing of so complex a nature is, as far as we can understand, wrought through the instrumentality of organs whose mechanism is extremely simple; so that we never arrive at a true ascertainment of their real use, but with an accompanying perception of their extreme simplicity.

These contemplations naturally excite our admiration and gratitude; and so overwhelming is their vastness, that we are glad to turn from general views to the consideration of some one object. If this object be man, we soon find, even in this comparatively small arena, with how small and insufficient an instrument he is furnished in the mind, when compared to the object on which it is exercised. Now nothing is more wonderful than his sympathies: from the foregoing reasons, we infer that they are of the highest importance, and that their laws are beneficial to him. For it matters not whether we survey man as a mere animal, whether we regard the phenomena which he presents in general, or his sympathies only; or whether we add those which regard him as the tenement of that extraordinary creation, his mind; we shall find

matter for interest at every step, for wonder in every function, evidence of intelligence in every fibre, and Omnipotence in all.

The body, in its physical sense, has been compared to a machine*, and, for purposes of illustration, often happily enough. I have sometimes endeavoured to explain to patients the real nature of a local disease, as it is called, by telling them that when the hands of their watches cease to move, they look for the cause in the general structure of the machine, that is, in the interior or works. We have no machine, however, with which we can compare the living body. In all that we are acquainted with, if they become out of order, they stop; no part really connected with their essential structure can be disordered but the whole machine ceases. The machine, as a motive engine, is dead, as it were; but the case is widely different in the living body. There is no single organ but which may be exceedingly deranged, and yet the machine continue its movements. All the complicated phenomena of respiration, circulation, assimilation, absorption, secretion, excretion,—nay, thought, perception, comparison, judgment,—may go on, and yet there may be some very important organs seriously disordered, and perhaps partly destroyed. You know, indeed, that people die with diseased heart, or lungs, or brain, stomach, liver, &c.; but the very mode in which you obtain this knowledge, shews you that they have lived with these diseases. How can all this be? Are we to suppose that parts are formed larger than natural, in anticipation of disease or partial destruction of them? How is it that these changes are allowed to take place in their physical properties and functions, not only as regards the sustentation of life for a time, with impunity, but actually in many cases not incompatibly with enjoyment? Now here we come to a point at which consideration unfolds to us one very important end, in the establishment of that sympathy between every part and every organ, which it is my object to impress on you. For it is by means of sympathy

* The general objects of this volume do not allow me to enter at large into the physiology of the sympathies. I am only desirous of doing so much as is necessary to give you a general idea of their practical application, by the enumeration of a few important principles. The more complete adaptation of them to different cases, belongs to the consideration of various diseases of which it will be my object, sooner or later, to treat in their respective places. So I have not discussed, at present, the sympathies evinced by the organs of sense, because these will be more impressively and usefully considered, when in a subsequent volume I have to treat of their diseases.

between parts, that that compensating action or actions take place, of which I spoke in the Second Discourse, and the tendency of which is continually to preserve an equilibrium. It is by means of sympathy, that an object of immense importance is achieved in the animal œconomy; and which is no less than this,—that no function, however important or apparently isolated from the rest, depends wholly on any one organ for its entire performance: and this preservative tendency of the laws of sympathy appears the more striking, in that the sympathies seem most lively, most general, or most easily excited, where they are likely to be most required; that is, at the different avenues of injurious influences, or, as I have called them, the various portals of the body. The mind, the digestive and respiratory organs, the alimentary canal, lungs, skin, and urinary organs, are instances in point. It is necessary, however, in teaching, that I should explain a little more fully what I mean by "no function depending on any one organ for its entire performance." This, physiologically considered, is quite true; the assistance, however, is rendered in two ways, very distinct in manner, but the same in effect. Sometimes one organ will literally execute the entire function of another organ, as when one kidney performs the office of both; sometimes it contributes to its performance, as happens between the skin and lungs, or skin and kidney: sometimes the assistance is rendered in another way,—that is, the relieving organ does not *actually* perform the functions of the organ to be relieved, but it gives it less to do. So that, whether the relief is rendered by an actual assistance in the task, naturally proper to the disordered organ, or by giving it less to do, the relief is equally true and substantial. Of the kind last stated, I will mention an illustration or two, for the purpose of rendering the proposition more clear to you.

No organ can perform that part of the circulation which the heart does; but as the force required of the heart is in proportion to the quantity of the circulating fluid to be continually projected, many organs can relieve its labour. In other words, the quantity of the circulating fluids is diminished, sometimes by the skin; sometimes by the kidney; always by the lungs; and, occasionally, by the whole of these organs. There are other modes of sympathy also, which refer to the nervous system, equally interesting: I must not, however, attempt to follow out every principle, but must be content with familiar and easily intelligible illustrations. I will take another organ, however, because it is one which, from

its importance, might readily suggest itself to you; and about which, as exemplifying the truth of a rule which I have stated, you might have some difficulty. No organ but the stomach can perform perfectly that process which it executes in the digestion of food*; but it is not less interesting to remark what happens in many cases where this most essential function is embarrassed. In indigestion there is nothing more remarkable than the loss of appetite; the inaptitute, and, in many cases, the incapacity for exertion. The body can hardly labour, the mind works with great difficulty; there is what we call listlessness and languor; the whole body, being imperfectly supplied with the pabulum literally necessary for its vital powers, becomes a niggard of their expenditure; and yet, if a powerful volition determines the body to exercise, or to an expenditure of power, in spite of these depressing inclinations, the digestive functions will again sometimes recover their powers. Nothing can be more beautiful than the pervading tendency to preservation, torture Nature how we may. A recurrence to the foregoing pages will furnish you with many examples of the *preservative* power through the compensating *actions* of the sympathies. In fact, every sympathy of the body presents evidence of this power; and could we understand as much of it in all diseases, as we can in some, or as we can in states which may be regarded as health, or very slightly different from it, we should most likely make more progress by such a discovery in the treatment of various maladies, than we have yet done by the accumulated enquiry of ages. Nor is the application of sympathy at all new in the treatment of disease. Medical men have, at all times, been acting on disease in a mode which is alone explicable by the laws of sympathy. For example, a headache arises very often from disorder of the stomach; you relieve the stomach of its contents, by an emetic, and the headache subsides. Now here the head was affected by one condition of the stomach, and relieved by another condition of that organ.

So again, pain may occur in the head as a consequence of costive bowels; we administer an aperient, and the head is relieved. Now I state two familiar examples of the action of sympathy in the causation, and in the relief of a common disorder; but any two organs in the body may afford similar phenomena. I wish you to recollect, that, in the examples above stated, a

* This is generally true, notwithstanding that, in certain cases, we contribute to the support of the system by the injection of nutritious matter into the lower bowels.

disordering impression has been conveyed from the stomach or bowels respectively, to the head, and the corrective, or impression induced by the emetic or aperient, has travelled the same route. Now, a great deal of the practical application of the laws of sympathy turns on the principle here mentioned; and it has been applied, very largely, to the treatment of diseases, even before the phenomena of sympathy had been made the subject of any very express investigation.

There are again other sympathetic phenomena, equally demonstrable, which have not, so far as I know, been made that use of, of which they are clearly susceptible. Still, keeping to the most familiar instance which occurs to me, you know, perhaps, that disorder of the liver will frequently produce also pain in the head; yet here, in many cases, an emetic will equally relieve the head as in the case wherein it proceeded from the stomach. Now this is something different*. The stomach, it is true, is disordered in these cases, as well as the head; but the cause is an affection of the liver: yet an impression on the stomach relieves the liver as well as the head; and thus the salutary impression travels back to the liver in a course retrograde, as it were, as regards the liver. But let us take another example or two of this kind of sympathy. Several individuals may be exposed to cold; the effects on each may be very different. It may produce appetite, or occasion loss of it; it may give rise to vibratory actions of muscles (shivering), sickness, headache, and various other disagreeable symptoms; yet food, or a glass of brandy-and-water, or perhaps even warm water only, taken into the stomach, may remove any or all of these sensations, notwithstanding that in some cases the stomach may be, and in others not at all, affected.†

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* The reader will of course bear in mind, that, in disorders in which the liver most prominently declares its disturbance, the cause may, nevertheless, have been in the stomach. But many disturbances of the liver, from cold, and from moral causes especially, do not allow us, with any reasonable probability, to infer that they have occurred from any intervening influence of the stomach.

† I have endeavoured to explain, at some length, and, so far as I know, for the first time, in my work on the Sympathies, as applied to the "Unity of the Body," how cold, or catching cold, occasions the multiform and too often serious maladies, of which, in this variable climate, it is so common a precursor; and to this I refer the reader. Dr. James Johnson, in his "Œconomy of Health," glances at the affection of distant parts, by the affections of the skin. I wish he had followed the principle out more fully. By the way, I would recommend that book to general perusal. It is written, perhaps, in a somewhat discursive style, and now and then

Now, here you have an organ secondarily affected; the stomach becoming the vehicle for the salutary impression which restores the equilibrium of our sensations; and, in some cases,—such as the shivering, for example,—where there is no evidence of its being affected at all.

Again, every surgeon knows well enough the various affections of distant parts, produced by certain disorders of the bladder, kidney, &c. Of these, none are more remarkable than coldness of skin and shivering; yet a warm bath not only relieves the skin, which is here secondarily affected, but very frequently the irritation of the urinary organs, whence it has arisen. In many cases, Nature does this by a reaction, in which the shivering is succeeded by profuse perspiration. This is by no means, however, confined to affections of the urinary apparatus; since an intermittent, which accompanies this, in common with so many other disorders of the skin, is but a succession of the phenomena to which I am adverting. Here we see again actions taking place in the skin, the organ secondarily affected, attended with relief, not only to itself, but also to those organs, from sympathy, with which its functions became originally disturbed. So, in patients who labour under phthisis (consumption), I have often seen them receive great relief from external warmth.

But hitherto, with one exception, we have been speaking of relief being transmitted from one organ to another, when both have become affected; though one may be primarily, and the other secondarily disturbed: but it is very important to recollect, that it is by no means necessary to the relief of one organ, by means addressed to another, that both shall have been affected. On the contrary, we may often relieve one organ by means addressed immediately to another, although that other shall have exhibited no indications of disturbance. We apply this principle most auspiciously when we make an impression on an organ, between which, and the one disturbed, there is the most direct and lively sympathy; though even this, perhaps, is not always a necessary condition.

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a good argument is weakened by a somewhat light and not very clear mode of reasoning; but it is, nevertheless, a very excellent work. It contains a great deal with which I for one would wish the public were familiarly acquainted, and to which I should be glad to find that the profession paid that attention which it deserves. Besides much that is very sound in a medical and philosophical sense, there is a moral tone preserved throughout the work, which, though not always very flattering, is for the most part pure and true: and, lastly, there is a happy buoyancy of style which renders it very entertaining.

Exemplifications of this principle are common enough. Asthma, an affection of the lungs, and commonly of the heart also, is, we know, remarkably relieved by emetics and sudorifics, in cases where we cannot fairly demonstrate any material disorder, either in the stomach or skin; the affection of the latter, of which I have just spoken, that is, coldness or shivering, is by no means a necessary condition to its affording relief to the urinary disturbance.

This application of sympathy is nowhere, that I have hitherto found, more valuable than in the regulation of the bowels. A patient may have torpid bowels (the bane of many a man's existence); he shall take various kinds of aperient medicines; he shall wash out his large intestines with injections; but still, whenever he remits these artificial modes of proceeding, the bowels become again torpid. Now, he may have no *detectable* disorder of the skin, and yet, perhaps, on an impression being made on it by the warm or vapour bath, his bowels begin to act regularly; or the medicines which were before hardly sufficient to procure a free alvine discharge once a day, become active purges, so that he is obliged to relinquish their use. I have known both occurrences take place. I do not say that the skin is the only organ through which this desirable thing may be accomplished; for I have done it through other channels, — for example, the kidney; — so that a diuretic has been administered internally, and with success, as an aperient, where aperients, commonly so called, had failed or proved troublesome.

Now here we have opened to us a simple principle in relation to the treatment of one of the most obstinate maladies we know of; namely, habitually costive bowels. I shall have plenty of opportunities for illustrating this point; but one case I am tempted to mention, because it occurred in the practice of another gentleman soon after I had first published some views in relation to this point, and by whom the case was kindly communicated to me. Dr. Green, of Marlborough Street, informed me that a patient called on him, to know whether he thought that a vapour-bath would be serviceable in removing a slight eruption on his face. Dr. Green was proceeding to make the necessary enquiries, when the gentleman brusquely interrupted him, saying that he had had plenty of advice; all he wanted was to know whether the bath would do him good. He took a sulphur vapour-bath; and the next day waited on Dr. Green, saying that a most extraordinary thing had happened — in fact, that he had had a natural evacuation from his bowels. As there appeared nothing extraordinary in this, he proceeded to in-

form Dr. Green that, some eight years ago, he had returned from India, in consequence of some complaint in his liver, and that he had continued a valetudinarian up to the present time; that he had taken a great deal of advice without success, his most annoying complaint being an inveterate torpor of the bowels, so that he was obliged to have recourse daily to an alternation of powerful aperients, and to the additional help of injections, to procure a discharge; that, for the last two years, he had been under the care of a distinguished surgeon, who had at length restricted his aperients to the alternation of four. I forget what they were; but was amused with the mention of two of them; namely, croton oil and a powerful quack medicine. These I mention as shewing the nature of the case. He took the baths daily for three weeks (Sundays excepted); and his bowels acted regularly every day without further assistance. It may be said that the sulphur here was an aperient, and that it acted in virtue of this quality; but I am not disposed to attach much importance to this, chiefly because I have seen similar results from vapour of water only, and because it was not very likely that sulphur should have produced so much, especially such continuous effect, after almost every other medicine had failed. Besides, his bowels acted on the Mondays, when he had not taken the bath on the previous day; and, lastly, they continued to act regularly after the bath had been wholly discontinued; all which is reconcileable with an altered condition of the system, but is not reconcileable with the action of an aperient, in the ordinary sense of the word. This case was related to me by Dr. Green soon after he had perused my work on the Sympathies, as an illustration of the principles there enunciated. The case, however, is not singular; impressions on the skin generally having often very marked effects on the bowels, as has been previously mentioned. Dr. Whytt relates cases of dashing cold water on the abdomen having proved effectual in the relief of constipated bowels; which is a different exemplification of this principle; that is, of relief consequent on impressions made on an organ not detectably disturbed; and of this I have also seen a very remarkable example.

A very interesting case occurred to me, shewing the value of applying these principles. During the influenza of last winter, a gentleman, aged sixty-six, requested my attendance, whilst labouring under a very severe form of this complaint. His breathing was much oppressed; his tongue very foul; there was a copious expectoration, which he brought up with great distress and difficulty; and he could not retain anything with certainty

on his stomach, vomiting occurring very frequently; his pulse was excited, but not indicative of power. I gave him aperients, and, some hours after, a dose of calomel with antimony. The aperient produced discharges from his bowels, of which the calomel and antimony seemed to promote the continuation. These discharges were literally black, and streaked with blood. The next day, however, he was so entirely relieved, that I apprehended no difficulty, although an enquiry into his habits shewed them to be exceedingly unpropitious to his recovery; and these habits his appearance remarkably demonstrated. I therefore enjoined him to continue his cautions till further directions were given him, and to take nothing but gruel and small portions of toasted bread. On visiting him the next day, I found him just as bad as ever, and even weaker. I now found that, contrary to my directions, he had been rendered so incautious by his rapid amendment as to take, on the preceding evening, a glass of ale and a glass of brandy and water. He was now much alarmed. I repeated the mercury, &c. as before, with no success. Notwithstanding that his secretions rather improved, they were still far from natural. He continued to sink: his stomach would retain neither food, medicines, nor wine, nor other stimulants; which last were cautiously administered, as he appeared to lose strength so rapidly. His breathing induced great accumulation of secretion in the respiratory passages; but he had no strength to relieve himself from scarcely any of such accumulation. I should have been glad, at one period, to bleed him, had I dared to do so; but I could by no means procure any evidence that his powers would bear any reduction of this kind; and now it was quite out of the question. His pulse was rapid and excited, but without even the semblance of power. Under these circumstances, I was determined to try whether I could not influence the condition of the mucous membrane of his lungs (apparently the immediate source of danger) by an appeal to the largest surface to which I could get access, between which and this membrane there is a remarkable sympathy. I therefore had him cautiously removed from the bed, put into a vapour-bath (steam-bath), and warm water, in large quantities, applied by injection to the mucous surface of the bowels. He was then put into bed; and the effect was every thing that I could desire. He slept several hours; he was quite a different person in the morning; his symptoms had all undergone a most remarkable mitigation; and, in three days, he was sitting up in his chair, comparatively convalescent. His skin

had acted profusely; his breathing became nearly natural; and, what was not less interesting, so did the secretions from his bowels. In a few days more, he was quite recovered. Now I repeat that this was a man of sixty-six, a man who had indulged his appetite, and who was habitually addicted to the use of ardent spirits.

In speaking, however, of the application of the principles of sympathy to the relief of torpid bowels, there are some other remarks which I am desirous of offering to your consideration.

When we wish the bowels to act, we give purgatives; but many circumstances render it doubtful whether we endeavour to imitate Nature in this practice so closely as we should do were her operations studied with more attention. When an organ does not act, there must be, of course, some cause for its inaction; and this it is which it should be our endeavour to discover. Now, when the bowels refuse to act, it is quite clear that the reason cannot be because they have not the stimulus of jalap, scammony, manna, or other purgative medicines. The first consideration of the subject, as well as the history of the whole of the phenomena attending the administration of purgatives, shews most clearly that we, in general, remove effects without addressing ourselves to the causes of these effects. I grant that, until we extend our views by an improved mode of study, even this may be very useful; that it often saves a patient's life, and must be done until we acquire better information; but that should be our unceasing endeavour. It is perfectly compatible with the most enlarged perception of our present powers to study to improve them: in fact, a true perception of our ignorance is the first step to the accomplishment of this end.

I say, then, that aperients are a poor substitute for the natural excitement. In the first place, do we ever produce a really natural discharge from the bowels by any aperient whatever? The answer is startling, but it is true—never. Let any one, even not of the profession, consider this point, and he will soon see that there is always a manifest difference in the discharges from the bowels, when they act spontaneously and when they act under the influence of aperients. In the latter case, pain or uneasiness is so common an attendant, that we at length cease to regard it, or only think of it as, in some degree, a necessary adjunct to the action of aperients. But *this* is not really the case: by care and a judicious adaptation of graduated doses, in the manner insisted on by Mr. Abernethy, and especially if we take a lesson from those who have

the care of other animals, and give gruel or warm fluids, we may generally avoid *pain;* but still the whole results manifest more or less of unnatural excitement. The evacuations are often fluid; still more commonly pultaceous, and attended with more secretion than natural; so that, in strictness, we can hardly be said to have it in our power simply to make the bowels discharge their contents*. But these are not the only evidences of excitement: almost invariably a state of torpor succeeds; and this is so common—I had almost said universal—that, even when the bowels subsequently continue to act spontaneously, a day of inaction intervenes. This is a certain sign of factitious, as contradistinguished from natural, or at least healthful, excitation. Even those who are most troubled with costive bowels will often tell you that their bowels act readily enough when excited by aperients; but that the moment they relinquish the use of medicine, the bowels again become torpid. Now I press this point on your consideration, because it is but one head, as it were, of that Hydra which is the bane of medical practice; which is so often ministering to the effects, without looking deep enough to discover the causes, of disease. So universal, indeed, is this kind of practice, that we may exemplify it with regard to any organ with equal truth. The stomach, perhaps, is the most common example, in the endless administration of tonics, and a variety of other agents, to which it is subjected; and a very long catalogue of articles applied to disorders of the nervous system affords us a multitudinous set of examples of the same kind. How seldom is it that the powers of Nature are really fairly tried, until those of art, or science so called, have entirely failed! How rarely it happens, that such simple, such obvious measures as alterations in eating or drinking, or change of air, are *duly* tested! and yet so potent are they in various disorders, that the most striking, the most clear, and indisputable proofs of their efficacy are derived from cases where all kinds of medical treatment have failed. But to keep to the bowels: I say that, when purgatives are administered for habitually torpid bowels, the evidence of excitement, the subse-

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* In our enquiries, it is often very important to ascertain the actual contents of the bowels, unobscured by any addition to them which aperients, exhibited with a view to induce the ejection of their contents, may occasion; and this where, notwithstanding, we may intend to employ aperients. To make this preliminary enquiry, the administration of a common warm-water injection is, perhaps, the best mode of proceeding.

quent torpor, their almost universal failure in this class of cases, shew that they do not, in one case in a hundred, minister to the cause of the malady.

Now, I am not contending *against their exhibition, in the present state of our knowledge;* but I say that we ought to endeavour, and that I believe we shall succeed if we do endeavour, to extend our knowledge on this important subject; and that I am certain that a very fruitful source of improvement is already to be found, as well as a still increasing knowledge in a careful observation of the sympathies. In one class of cases, we may perhaps be said to employ aperients, in *approximation*, at least, to a more correct principle; and this is when we excite the secretion of bile, in costiveness, depending on a deficiency of that secretion: but here again that question, which we would hitherto moot with regard to the bowels, recurs in respect to the liver—what has rendered it torpid? Was it because it was not stimulated by mercury, mineral acids, or any other of our probilious medicines? Unquestionably not. We have no reason for supposing that the liver is naturally accustomed to any such stimuli*. Nature here again shews us that they are at best but poor imitations. The actions they produce are accompanied by sensations which do not attend the natural action of the liver; neither is the torpor of the liver, when habitual, relieved solely by any such measures. We are obliged to employ a variety of others, if we wish really to remove the malady. So, whether the bowels or liver, or any other parts, do not perform their functions, and you cannot discover, in the organ affected, the cause of the disturbance, you should examine the condition of all the other organs, and especially those between which and the disordered part there is a well-known or easily excitable sympathy. If the bowels were the part disordered, the skin, lungs, stomach, liver, and kidney, would first excite your attention. Impressions on all these organs will, in different cases, relieve costive bowels, when all other means prove nugatory; of this I have, in my own experience, seen examples. As regards the lungs, nothing is more popularly familiar. There is nothing more common than to hear people say, that this or that place agrees very well with them; that they have never any trouble with their bowels when they are there. It is true that, in these cases, several causes may operate; but this is

* I cannot too often impress the fact, that the seat of the disorder is one thing; the seat of its cause another.

only another example of reacting by secondary causes on the original cause of the disorder. A man, exposed to the thousand and one causes of disease, in a crowded city, gets his bowels out of order and his mind disturbed. He goes into the pure air and quiet of the country, and his mind becomes tranquil and his bowels regular. For, whether the air of the country acted on his physical, or the peace, quiet, and change on his moral, constitution, the principle is the same; it is that of acting on a part secondarily affected, in consequence of its sympathies with the function originally deranged. Mental disturbance is, no doubt, a fruitful source of disordered bowels, as they are also constantly enough primary sources of mental inquietude. The most inveterate case of intractable bowels I ever knew, proceeded from a moral cause; the liver having been first intermediately disturbed: but the bowels maintained their sluggish disposition, although the liver appeared to have been corrected; still, however, not in the same degree. I consider the question of costive bowels so important, that I shall add yet a little more in regard to it. In looking to the causes of costiveness, we should consider of what the bowels are composed, and also in what their action consists. Now you know that they are of a compound structure; that, externally, they have a serous membrane; internally, a mucous membrane; intermediately, they are muscular; and that these several parts are united by cellular tissue: that they are also largely supplied with nerves, vessels, absorbents, and all the apparatus of a high vitality. Now the *proximate* cause of the ejection of their contents is, undoubtedly, their muscular action; and its absence, of their torpor. There are many conditions under which muscular parts act weakly, inefficiently, or not at all; and this happens also to the bowels: but this influence, whatever it is, may operate directly on the muscular structure; or, mediately, through its mucous, serous, or even cellular, contextures. But, again, the muscular coat only derives *its* power from the nerves; and we thus readily understand how its functions become influenced by a multitude of causes not to be found in the part itself, but which arise from the sympathetic connection which exists between all parts, and especially, perhaps, between parts of similar structures. Now this sort of view, with regard to the muscular coat of the intestines, suggests to us the probability, at least, that it may participate in any general condition of the muscular system; and shews us, therefore, something like an explanation of that which frequently enough happens, namely, the correction of

torpid bowels by means very different from our aperients. It renders intelligible how bark may regulate the bowels in one case; any means which improve the general health in another; and, in some rare cases, even opium. But, again, the muscular coat will sympathize with its more immediate connections; we see, in fact, that it does. If the peritonæal covering be inflamed, the bowels refuse to act; and the real aperient here is the subduction of inflammation. An opposite effect will take place from irritation of the mucous surface, and the muscular coat will act inordinately; but the correction of this is the removal of the irritation of the mucous lining.

I have known the bowels, in a case of great difficulty and delicacy, regulated by bark more successfully than by any other medical means; a strict regimen accompanying it: and improvement of the general health, air, and exercise, are too familiarly known to achieve the same object, to require that I should cite examples. The induction of the action of the bowels by opium is more rare; wherefore I will cite an example or two. I recollect a very severe case of enteritis in which every thing failed; until at length a physician (Dr. Lidderdale) prescribed opium, on which the bowels acted; and the patient's life appeared to have been saved by it. In a case of diabetes mellitus, in the fourth volume of the Transactions of the College of Physicians, by Dr. Warren, the patient took four grains of opium; at first every night, and subsequently every second night; and it is remarked, "as curious," during the latter period, that the bowels acted better when the opium was administered than when it was omitted. I mention this, as shewing that inaction of the bowels depends on a variety of circumstances; and that the mere absence of their mechanical functions, though of course the *proximate* cause why their contents are not discharged, is, in fact, not the true cause of the disorder; and that, when we administer stimulating or irritating matter to the mucous surface of these viscera, we are but administering to proximate, and indeed secondary, causes. In some cases, as has been already shewn, the laws of sympathy not only allow of this mode of proceeding, but, by reflecting back salutary instead of disturbing impressions, do truly act on the real causes of disorder. The true value of this principle, however, consists in the superaddition which it forms to the plan of attacking organs primarily affected when this cannot be managed or proves unsuccessful, not as standing in precedence to it. Purgatives, you know, are often administered with very differ-

ent intentions than those of merely evacuating the contained matters*, and very necessarily; but I am not discussing that class of cases. I am here only speaking of habitually costive bowels, in relation to the mode in which men set about relieving them, and desirous of impressing on you, as one very important application of the sympathies, that the state of the alvine function *usually* depends not on any condition of those organs abstractedly considered (mechanical obstruction, of course, apart), but on some condition impressed on them through their sympathetic relations, either with the general state of the nervous system, or with the condition of some particular organ: that the discovery of this is most readily made by considering the various organs of the body in relation to their sympathetic connections; and that this will often enable us, by very simple means, to do more towards correcting habitually torpid bowels than all the aperients in the Materia Medica. To this object I limit my observations at present; plenty of opportunities will hereafter occur for considering and illustrating this important subject more fully.

The following case may be mentioned as illustrating the foregoing and some of the subsequent observations:

Sarah Jones, aged forty-two, 13 Water Court, Islington, a patient in the Finsbury Dispensary, applied for relief on account of the following symptoms: she has lost her voice, not being able to speak otherwise than in a whisper. She attributes the loss of her voice to getting wet in the feet, almost five months since, her bowels being at that time costive, which is her general habit. Her catamenia have ceased rather more than two months; her bowels are costive; her tongue yellowish-white. Her gums are much elevated, and highly vascular; her urine scanty, but clear. Her skin acts every night in an unusual manner: she describes herself as being bathed in a most profuse perspiration. Mr. Leigh and myself agreed to try first what stimulating the kidney would do, since, she being able to go about her business with such important functions imperfectly executed, or actually suspended, it seemed probable that the profuse action of the skin was the source of immunity from more serious ailments. Taking, therefore, the hint thus afforded, we proposed to make the kidney participate more

* In cases where the object is to diminish the circulating fluids, the large secreting surface of the alimentary canal presents a powerful engine in aid of such a purpose.

than it appeared to do in the excreting function. In order to keep the reasoning as close as we could, we simply gave her a diuretic, the nitrate of potash. In three days, she came and surprised us not a little; in the first place, by speaking in her natural voice. She said that the medicine had produced more water, and natural in appearance, but that her bowels had also acted very freely; and, on the occasion of the second action, the catamenia had returned. The profuse night-perspirations, she said, she had "quite lost." We kept her under our care about a week longer, during which she remained quite well. Surely nothing can be more beautiful than the simplicity of this case.

The study of the sympathies, then, discloses to us this very important fact,—that salutary influences may be impressed on an organ, either directly or through the medium of any other organ; and that there is no one particular course, between any two organs of the body, which is to be regarded as a necessary condition to the conveyance of such salutary impression. That, if the liver affect the stomach, you *may* correct the stomach by means addressed to either organ; or even to a third, in some cases, which, so far as you can see, is not at all affected, provided that there is a ready sympathy between that third organ and either of the two others: and this is as true, mutatis mutandis, of any two organs in the body, as it is of the stomach and the liver.

I say you *may* do this; I do not say that you always can, because we find that there are plenty of disorders which we cannot correct: but that which I am anxious to impress, is, that the failure does not depend on any law of sympathy as to this or that course being essential to the conveyance of salutary impressions. What Mr. Hunter terms reflex sympathy, and which he exemplifies in the feeding of the polypus*, that which had been still more strikingly exemplified by Dr. Whytt, in the experiments which have been mentioned, and that which has more recently excited the attention of Dr. Marshall Hall, though valuable and correct, seems only a part of the subject, as I would have you to understand it. I care not indeed how it be explained; for it is with the facts that I wish first to deal. Therefore, whether the brain, spinal marrow, or the

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* "The stomach first sympathizes with the whole body when it (the polypus) wants repletion; and afterwards, by a reflex sympathy, the body is called into action, and its little arms extended," &c.—Hunter's Works, by Palmer, vol. i, page 328.

nervous system of individual organs convey impressions from and to them direct, or through the medium of the great nervous centres, it is unimportant.

The fact to be remembered, is, that all sorts of impressions, whether disturbing or tranquillizing, may be conveyed from any one organ to any other without regard to direction; and that nothing *short* of this view will enable you to combat disease on that vantage ground, as compared with ordinary practice, which a constant and due regard to the laws and phenomena of sympathy supplies.

If a patient have indigestion, which has continued in spite of tonics, plain diet, exercise, and pure air, the foregoing principles would be thus applied. I try if I can influence his stomach by his sympathies. I am ignorant, perhaps, what organ may be tried with best chance of success; but I direct my views to those with which observation and experience convince me the stomach has a marked sympathy. Well—I will suppose that I address the skin, as this is common; and I make him clothe warmly, especially the feet; I order the flesh-brush, warm or vapour baths, or I produce some irritation on the surface; I employ these and many others which might be mentioned, singly or more or less in combination: and now the stomach has become calm, which had been fidgety or irritable before, and that too without tonics or perhaps any other medicine—now I can tell you that, if you are analytical in your examination, and assiduous in your attention, you will meet with many cases of this description.

Or suppose the disorder be of the liver, and every ordinary means fail—that mercury, the mineral acids, and other things, usually excitants to the liver, prove unsuccessful—or, what is also common, not only fail, but disorder the œconomy of the system. I know that the skin, the kidney, the bowels, and the mind, sympathize with the liver as well as the stomach. I address myself to these organs, either simply or in conjunction, as the particular case may suggest; and the disorder is corrected. Now here again you will often succeed where your probilious medicines, commonly so regarded, have failed, or proved injurious. Now I hear some learned critic say, "Well, we want no ghost to tell us this; we do this, although we may not always be aware of the plan on which we are acting." Very good; I wish to put the most trite exemplifications I can of the principles I am endeavouring to teach; because, when the extent of their application is unfolded, in relation

to the treatment of particular diseases, the superstructure on the foundation I am now laying will be as intelligible and easy as I am inclined to think it important.

I must, however, bring this part of our business to a close; but I cannot do so without a remark or two on the application of the sympathies, in relation to those which exist between the mind and the body. No one doubts of this sympathy; nor does any one dispute, that, in disorders of the mind, induced by physical disturbance, mental quietude produces a very salutary reaction on the bodily disorder: or, if the mind be primarily disturbed, that care and moderation of the bodily *ailment* not only very much modifies its extent and severity, but also reacts favourably on the mind. But I am convinced that careful investigation will enable us to make a very much more powerful application of these phenomena than we have hitherto achieved. For, at present, our treatment of the mind, in relation to physical disorder, consists of what appears to me to be a very coarse generalization, being limited in general to abstinence from undue exertion, avoidance of painful impressions, and the like. Now let us examine this point a little. If it be true that the mind be more or less affected by different organs, and again differently in different cases, which we know to be fact; it seems, at all events, very unreasonable to expect much benefit from a treatment essentially the same in all. For if there be still those who (notwithstanding the evidence afforded by the very striking analogy of the five senses, by the nerves of motion and sensation) still feel a difficulty in ascribing different functions to different portions of the nervous system or different parts of the brain; yet they must admit that the sympathy shewn between the mind and body, is shewn in very different, and even in very opposite, modes; and, whenever the mind is, so far as we can see, primarily affected, that its manifestations of disturbance are very different in different cases. In our appeals, therefore, to the mind, when suffering from disease of the body, to have only one mode of treatment, or one not essentially different for all cases, appears as unreasonable as it would do were we to treat every lunatic in the same manner.

Nothing can be more varied than are the manifestations of the mind in its sympathy with the body. Here again I mention purposely those which are most trite. In one man we have cheerfulness and hope beaming to the very last; in another, a settled gloom and despair from the commencement: in one we have a

subdued tone and a prevailing kindness of feeling; in another, a sustained irascibility. In one, fear of want, and an active principle of avarice, who shewed no such disposition before; in another, habitual distrust of those in whom previously, and naturally, he had been accustomed to place most confidence. Neither are the intellectual functions disturbed in modes much less varied. Some individuals have individual perceptions disordered, some their powers of combination, and almost all suffer more or less of a general inefficiency in the particular pursuits to which they have been accustomed. In fact, the manifestations are exceedingly varied, and the illusions just as different as those presented in disordered conditions of the external senses. And as the eye has illusory vision, the ear illusory perceptions of sound, so have we illusions as diversified in the mental perceptions*. And I cannot see that we have any right to presume that phenomena, so different as these are from each other, whether in their natural or diseased

* I have spoken of different organs, and of different functions and faculties; and I have no doubt myself, that different parts of the brain do exercise different functions; since, putting aside what has been done by phrenological investigations, all analogy is in favour of this view; whilst I know of no single argument which can be urged against it: but it is very immaterial to my argument, how the different faculties are set in motion, abstractedly considered. Suppose that, in a given case, I found that a principle of avarice were the feature of disturbance and that I had reason to believe that it originated in, or maintained a disturbance in, any bodily organ, as the liver; my object would be the same, whether the morbid manifestation was regarded as resulting from the brain generally, or from some particular portion of it. The main fact for me to know in the moral treatment of the case is, the impression with which I have to deal, and that the object is to remove that impression. Now, if the means proposed were the remedies solely of a medical kind, it might be one thing; but as this is not the case, it matters not to me whether the part of the brain in which the disturbed organ was seated, was at the side, the vertex, or the base, or pervaded the cerebral structure generally. In a more advanced state of knowledge, this might be different; and I believe the phrenologists do some of them apply remedies to particular districts. I have said enough already to shew what I think as probable in regard to this subject; but I do not wish that the observance of demonstrable, and, in fact, well known phenomena, should be encumbered with anything which may be regarded, as yet, as theoretical or speculative; nor that simple facts should have their just importance merged in the consideration of the principles on which they may or may not depend; which, by diverting attention, may tend to disjoin them from the useful and obvious conclusions to which they lead. For that avarice, the example chosen, will disturb a man's body, and that certain bodily disorders will engender an activity of this principle or sentiment, are truths which rest on the indisputable authority of universal observation and experience; and which are

state, should relate to one and the same physical locality, any more than we should have to presume that sight is conveyed by the auditory nerve, or sound by the retina, which we know cannot be. I am disposed therefore to doubt whether, if we could understand more of this subject,—and I see no reason why we should not, if we try (since a more careful observation of phenomena is the thing required),—we should not find that some of our general measures for tranquillizing the mind are much on a par with that of the quack who cures all possible diseases by one remedy; and as far from the mark as we should be, were we to attempt to relieve the *eye* by *silence*, or the *ear* by exclusion of *light*. In one point, there is a striking analogy in all mental and bodily disorders, whether coexisting or not,—viz. that they have one feature in common—the loss of equilibrium between the various organs. Some one organ does too much or too little; and it seems a whimsical way of meeting this condition, by giving all the organs a *general* repose; for change of scene, absence from exertion, cheerful employment, though excellent in their way, appear but coarse generalizations. They imply no analytical enquiry into the particular function, primarily or sympathetically disturbed, much less any special aid to it, at which we can arrive only by such analysis. The analysis, I think, would often enable us to understand the particular organ or function of the brain which was disturbed, and conduct us to more true and precise principles in our endeavours to make it react favourably on the bodily disorder, or to relieve it (I mean the mental disturbance) according as it might have been primary or secondary. Suppose that a man thought himself abandoned and worthless, that his friends were unkind and faithless. I conceive that anything which strengthened his self-esteem would be a judicious appeal to his disorder. This, perhaps, might be done by engaging in some schemes, no matter whether of study or occupation, where his success might be rendered certain; and by judicious doses of encouragement and approbation. So, if a dread of want, and a morbid superposition of a principle of avarice, were the leading feature; and those I am alluding to are the most common; I conceive that a factitious activity, however induced, of

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neither shaken on the one hand, nor confirmed on the other, by the physical connections of that principle; whether that be in the general mass of the brain, or any particular part of it, or neither, were that conceivable, this question has obviously nothing to do with the simple fact at issue.

any opposing propensity, would be the judicious mode of proceeding;—as, for example, if we could lead him to any act of successful benevolence, or successful enterprise in regard to any object not ministering to avarice. I cannot, however, enter on so vast a subject as the manner in which these things should be done; I am only here anxious to illustrate what I mean. The subject is one of great difficulty, and perhaps surgeons have scarcely as good opportunities of cultivating it as some other classes of the profession. I am well convinced, however, that the laws of sympathy might be rendered much more available in relieving mental disorder; and, what is more to my purpose, through it, disorders of the body, were our examination of the particular sympathetic relations of various mental and bodily functions as assiduous, as our conviction of their general sympathy is unqualified. The conclusion above stated appears to me irresistible; because we know that different functions of the mind sympathize in different disorders of the body; and also, from the repugnance which the mind has to admit, or indeed conceive, that disorders so manifestly different can be relieved by the same, or nearly the same, remedies: besides, I believe that, in the treatment of the insane, some approximations like these are really kept in view; and I cannot see why the principle of treatment should be less accurate in disorder of the mind, resulting from disorder of the body, than when it occurs from moral causes; to say nothing of those cases of insanity, a very large number—I had almost risked the word, proportion,—to which bodily disorder so materially contributes, or which it entirely occasions.

But if the mind, being primarily affected, disturb some bodily organ, and this organ be ascertainable, how are we to set about relieving it in cases where we have no means of relieving the cares and anxieties of the mind, whether natural or factitious? since change of air, scene, or diversion, suspension of ordinary occupation, &c. which are occasionally in our power, though excellent remedies of their kind, are, as we know, too often unavailing.

Where this happens, it is very important to be impressed with the fact,—that the same law which allows any organ, primarily disturbed by the mind, to react on the mind, and thus increase the disorder of which it is itself the offspring, allows it also to become the channel of tranquillizing influences. Impressed, I say, with this fact, we no longer abandon the valetudinarian, whom we know

to be labouring under depressing moral causes, to the chronic and uncertain influence of time, but endeavour to influence his mind by care and correction of bodily disturbance, in the same manner that his body has been unfavourably affected by his mind. Now I could mention a great many examples of the application of this principle; but I will select the following; not because it is the best in immediate application to the point under consideration, but because, altogether, it is very strongly marked in other respects. A gentleman applied to me, who represented himself as a great valetudinarian: a state of infirm health, of some years' duration, had been attended by several attacks of illness; for these, remedies of a powerful nature (calomel chiefly) had been resorted to, which again restored him to his ordinary condition, but which was, as I have observed, that of a valetudinarian.

At all times, his distressing symptom was a lowness of spirits, accompanied by a very remarkable and uncontrollable tendency to melancholy retrospection. So inveterate was this tendency, that nothing had proved sufficiently powerful to divert him from it; although, on one occasion especially, an entire change of scene, with occupation on matters of great interest to him, had been in simultaneous operation. I found him an acute, well-read man, with something of a scientific turn besides. In answer to my various enquiries, he told me that he scarcely remembered that he had ever been free from a tendency to retrospection; and that he regarded a peculiar degree of this as natural to him; but that its increase and constant presence, and also much of the melancholy by which it was accompanied, were certainly, though of many years' standing, subsequent superpositions. I found his body in bad order generally; but it appeared to me clear, that his liver was chiefly, and, as I thought, probably primarily disordered.

I should mention that, at the time his family induced him to consult me, his symptoms had become so exacerbated, that they were under serious alarm as to his safety; and a hint was thrown out that something had occurred which justified the most melancholy apprehensions. At our first conversation, he expressed himself willing to follow any plan I should propose, provided that I really thought it would be of any service to him. As he put this very strongly, and desired me to be candid, I answered him without the least reserve. I told him that, if he would cordially co-operate with me, I thought I could materially improve his present condition; but that the history of his case (which his family had con-

firmed) rendered it impossible for me to say to what degree. "I am of opinion, sir," said I, "that the disorder of your bodily functions, and of your liver especially, are sufficient to account for a great deal of the mental inquietude under which you labour; and that the augmentation of it which you have suffered of late years may perhaps be wholly dependent on such disorder; but, unless I could discover how much of this increase of mental disturbance may have been induced by your bodily disorder, and how much depends on that increase of your natural disposition, the result of time and indulgence,—and I can do neither,—so cannot I say, nor speculate safely on, the degree of advantage which you may derive from any plan that I can propose; but whatever of your mental may arise from your bodily disorder I think you may reasonably hope to be relieved from." He seemed pleased with this mode of putting it; and agreed implicitly to follow a plan, of which the following is the substance: I first well cleansed his bowels by graduated doses of aperients, and then endeavoured to regulate their action and their secretions, which were both wrong: his stools were very dark or black, and fœtid, and his tongue very foul. His diet was strictly regulated; and, as he could not refrain when in society, I reluctantly advised him for a time to give it up altogether, that of his own family of course excepted. I ordered him to begin gradually with daily horse exercise; and, that he might have some object in so doing, and at all events sleep in good air, I made him take a house in the country. A very careful consideration of all circumstances induced me not to prohibit his attention to business; so that he rode backwards and forwards to town, except when the weather was unfavourable, when he was either to spend the day in the country or come to town in the coach, as suited his choice or convenience. I tried to solicit regular action from his liver; but I was very cautious with regard to mercury, generally trusting to aloetic medicines, with occasional small additions of that mineral.

The medicines, however, required occasional modifications; and, with the exception of that above stated, his *liver* was generally solicited by applications to the *bowels*, every care being taken to avoid giving pain or more medicine than was adequate to induce their action. With this sort of treatment, his secretions became natural; his stools became indicative of healthy biliary secretions; his urine, which had been dark and cloudy, became clear and natural in colour; and, lastly, what was better than all, his tendency to melancholy retrospection entirely left him.

This case, though a comparatively recent one, made a deep impression on my mind, and the more so, as it occurred a short time previously to a very curious case, which was related in my hearing, of a patient who laboured under a very peculiar state of mind, which had led to self-destruction; the patient having a voracious appetite, and having been allowed to indulge it to such an extent, that his consumption of meat had been six mutton chops a day.

Now it appears to me difficult to conceive a case more unpromising, as regards the complete removal of the mental disturbance, than the one which I have related; since it would be a very hazardous and bold presumption to say that the whole of it was the result of bodily disorder; yet we see the removal of a morbid, peculiar, and very dangerous moral disturbance removed by measures which certainly appear to *have influenced the mind through the correction of the functions of the body.*

The phenomena of sympathy shew that the whole mind may influence the whole body, or different organs of it; and that disorder of the whole body, or of different organs of it, can affect the mind, either generally or in some particular one of its functions: it seems to follow, as a necessary consequence, and in fact but as part of the same proposition, that, in particular cases or in particular persons, certain organs of the mind may affect certain organs of the body, and *vice versâ;* and hence it follows that our power of applying these facts in the treatment of disease will be, *cæteris paribus*, in proportion to our knowledge of the reciprocal sympathies between certain bodily and mental organs or functions.

That investigation of the phenomena promises an approximation to a more perfect knowledge of their several relations, seems probable, from some preferences between certain mental faculties and bodily organs being already so exceedingly obvious; and, if we carry with us, in our investigation, the recollection that, in a strict conformity with what appear to be the laws of sympathy, whilst one faculty may, in a general sense, hold a more vivacious sympathy with one organ than another, yet that individual peculiarity may give rise to great variations in this respect, we shall have the chief elements necessary for the investigation in question. In this way we may possibly arrive, at no distant period, at much more direct and certain modes of *restoring* mental tranquillity, whether it be solely with reference to mental disorder, or with a view to make it act sympathetically in the relief of the body, when we discover and attack the condition of a particular organ, instead, as in some

other cases, where our ignorance of the key to the malady obliges us to be satisfied by a sort of general avoidance of influences which are held to be injurious.

Before I conclude the subject of Sympathy, there is one other subject in connection with it, on which I will add a few remarks,—and this relates to the facility with which it explains the connection of local diseases with states of the general system. Many persons, who are ready enough to admit the influence of general states of health, or of particular functions with local diseases (and, in their use of this term, they generally limit it to diseases as seen on the surface of the body,) feel a great difficulty in understanding how this can be, in cases where the local disease is influenced by *local* treatment, especially where their endeavours, by means directed to the general system, have failed. In the first place, I must endeavour to dispel certain erroneous notions, or idols, which exist in regard to this subject, before I can hope to explain the matter; and especially that frequent connection of the term 'local disease' with actions at or near the surface of the body, which is evidently an error; for no reason can be shewn why a disease near the skin should necessarily be more local than when seated in any other part. But the truth is, that, in the sense in which the term is used, there is no such thing as a local disease, or a disease whose relations are confined to the seat it occupies. Injurious influences, acting on any organ, as the brain, lungs, stomach, or (what tends to puzzle people still more) the skin, may produce impressions and actions in the part, which action may confine the disordering impression, and the processes for its removal, to the part in question; and, so far as we can perceive, this order of occurrences constitutes the purest notion we have of a local disease, whether it occur on the surface of the body or in any other organ. But this is very little, in fact nothing, in aid of the supposition of local diseases; for we know very well that this *power in any part* to correct, or in any way to dispose of, an injurious impression, *depends on certain conditions* of the whole system. It matters not, as an abstract consideration, what these conditions are; but that they exist is as demonstrable as any thing in the whole range of natural philosophy. In many cases, they are demonstrable in their influences on local actions, both in suspending salutary processes, in creating them when they exist not, and also in the original production of diseases which render them necessary. I shall enter more fully into this subject hereafter, when I shall have to speak of diseases of the

skin—one of the strongholds of error. But I will not leave the matter wholly untouched on the present occasion, as far as illustrating the application of sympathy to the understanding of the question.

We will take, then, on the present occasion, the purest example of local disease we can find, and the most glaring instance of what is emphatically allowed to be a constitutional one; and, in both, we shall see that the sympathy of the whole body, or of any organ with all parts of the body, explains the phenomena. Now a man has a compound fracture that is, in itself, local; but we find that the processes of repair actually depend upon the state of the whole body, just as certain as any constitutional malady whatever: they are, in various cases, accelerated, suspended, or wholly put a stop to by very demonstrable conditions of the whole economy; yet, on the other hand, local influences are equally capable of effecting these objects, and hence the necessity of avoiding them by quietude, regulation of temperature, and so on. Now gout is a malady depending, on the other hand, altogether on the state of the body: this condition is no less real because it is varied; nor does it produce gout less certainly than the accidental force did the compound fracture. Yet here again, in different cases, regulation of temperature, warmth, or friction, is not only productive of comfort, as regards the part, but have a beneficial influence in tranquillizing the general condition, of which the gout is the manifestation. Now, as the laws of sympathy teach us that salutary, as well as disordering, impressions can be conveyed from part to part, without regard to direction, they remove any difficulty in understanding this and a thousand other similar phenomena; much less do they impel us to the absurd expedient of arguing, from such occurrences, that the diseases are local. I have taken two very extreme examples on purpose; for you will find that these really include the facts on which the supposition of local diseases is founded. In many affections of the skin, local applications do good; and I have heard, very lately, this argument made use of to support their local nature; but again the same mode of reasoning applies; viz. that as local diseases can react on the state of health which produced them; so any thing which soothes their actions, or in any way prevents their reacting influence, will do good. Then again, some diseases are cured by local remedies alone. Although it seldom happens that this is, strictly speaking, the case, yet here again the laws of sympathy explain the matter; since you are to regard the local malady but as

a channel of communication with the disordered body. The action of narcotics, arsenic, lead, and a multitude of other medicines, illustrates this. It should be remembered that many local diseases are the expenditure of diseased actions: they are the relief that Nature herself affords; and they will often get well without any aid from art whatever; whilst, where they do not, we feel (without exception in my experience) that this particular class of local maladies is maintained, because the original disturbing impressions, of which the local malady is the result, are allowed to be in continued operation. The various kinds of porrigo, many examples of ulceration in the legs, are, in many patients, illustrations of these positions. But this is a subject which will be discussed more fully on a future occasion: I can scarcely touch on it here; it is too vast, both in the facts connected with it, and the error which surrounds it, to be grappled with otherwise than as a distinct subject.

To place, then, the facts derivable from the consideration of the phenomena of sympathy, in a sort of tabular arrangement, which shall, at the same time, assist you in recollecting them, or in refreshing your memory by a table for ready reference, I present you with the following catalogue of conclusions:

1. Any disorder disturbing the general economy may affect, in a particular degree, any organ or any tissue in the body.

2. Any disorder or injury, primarily affecting any particular organ or any particular tissue, may affect the whole body.

3. Any organ, primarily affected, may affect any other organ in an especial manner; but the organs so secondarily affected will be different in different cases and in different individuals.

4. That, in investigating the conditions of organs sympathetically or secondarily disturbed, we may expect that continuity of surface, contiguity of position, community of structure, and concurrence of function, will be the chief circumstances by which our enquiries will be auspiciously directed.

5. That, notwithstanding the foregoing, neither continuity, contiguity, nor community of structure, nor concurrence of function, are absolutely necessary conditions, individual peculiarities giving rise to sympathetic actions independently of these conditions; which (though we may not be able to discover the law) are not the less demonstrable in their phenomena.

6. That the phenomena presented by organs *apparently* primarily affected, are generally those most important and prominent,

yet that we can by no means establish such a rule; for, whilst many organs, apparently thus primarily affected, are found in fact to be affected secondarily, it often happens that the secondary or sympathetic disorder is sometimes the most important, sometimes most prominent, and sometimes both in conjunction.

7. That the sympathy between all parts is mutual, without exception, so that the influence travels either way; but that considerable differences are observed in the phenomena in different organs.

8. The sympathy may be equal, as well as mutual, being as readily excited by the affection of either one of any two or more organs.

9. That, on the contrary, though mutual, it may be much more readily excited in any two organs, accordingly as one or other may be primarily affected.

10. That, in discovering the sympathy of any one organ, with any other more obviously deranged, pain, or indeed sensation, of any kind, is by no means a necessary, nor indeed a frequently, existing condition.

11. That the manner in which an organ is executing its functions should be the constant, as it is the most important, object of enquiry.

12. That this enquiry frequently unfolds the reason why the system has been preserved apparently free from disorder, whilst some important function may have been obviously imperfectly performed.

13. That, in the management of disease, the ordinary mode of addressing our treatment to the organ which we believe to have been primarily affected, is to be regarded as a good general rule, but still as one which admits of many important exceptions.

14. That, as sympathetic disordering influences may travel either way between any two organs, so may influences of a salutary tendency.

15. That the exceptions, therefore, to the general rule 13 (by which the sympathetic disorder of organs is addressed through the organs primarily affected) takes place—First: Where all our remedies have failed. Secondly: Where, from any peculiar condition of the primarily affected organ, or from some idiosyncrasy in the individual, the remedies on which experience has placed most reliance may be injurious. Thirdly: Where, though the remedy may be successful as regards the present ailment, we have good ground for

perceiving that it may be ultimately of injurious consequence or tendency. Fourthly: In cases where remedies prove injurious by acting on some organ to which they are not directed.

16. In all these cases, the best effects may be obtained by directing our attention to organs secondarily affected; by which remedies, which were inert or injurious before, may be rendered active and beneficial: or, where they cannot be so rendered, they may be dispensed with altogether.

17. That a very important extension of this plan of acting (under proper restrictions) on organs secondarily affected, consists in the fact, that the same good results may be sometimes obtained by acting on organs which are neither primarily nor secondarily affected; organs, indeed, which manifest no disorder at all, provided only that they are organs which have a known sympathy with those which are affected—and this whether the affection be primary or secondary.

Lastly. That these facts not only enlarge our views of treating diseases of the body, with reference to the machine as a whole, but that they are calculated to give our efforts a safe and scientific direction, and one in exact conformity with that which Nature herself observes daily in the preservation of health, and very commonly in the most marked manner in the removal of disease.

DISCOURSE VI.

OF INFLAMMATION.

As I am now about to commence the consideration of diseases, I will offer a few remarks on a passage in Mr. Hunter's writings, which I must think (with all my admiration of him) calculated to convey an erroneous impression.

Mr. Hunter, in his Remarks on Adhesion, or Union by the first Intention, speaks of injuries and disease as if there were distinctions between them of a kind which, on examination, will not, I think, be found tenable; and the passage seems to me to tend rather to obscure the law, of which, at the same time, like many other reflections of this wonderful man, it points to the discovery.

"I may observe," says he, "that all alterations in the body are the result of injury or disease; and that all deviations from its natural actions arise from a new disposition (?) being formed. Injury is commonly simple; disease more complicated. The dispositions arising from these are of three kinds: The first is the disposition of restoration, in consequence of some immediate mischief, and is the most simple (?) The second is the disposition arising from necessity, as, for instance, that which produces thickening of parts, ulceration, &c. This is a little more complicated than the former, as it may arise both from accident and disease, and therefore becomes a compound of the two. The third is a disposition in consequence of disease, which is more complicated than either, as diseases are infinite. Yet many diseases, although complex in their natures, are so simple in their extent, as to allow the removal of the diseased part, becoming, when that is done, similar to many accidents. As disease is a wrong action of the living parts, the restoration to health must first consist in stopping the diseased dispositions and actions, and then in a retrograde motion towards health."

Now, notwithstanding the somewhat hasty generalization in the above (as I consider it) difficult passage, there is abundant evi-

dence that it arises from beautifully enlarged views, which we can only appreciate by reflecting duly on the state of medical science *at the time* it was written. Yet, as I would earnestly entreat every one, and especially those who have made some progress in elementary matters, to study most profoundly this Argus-eyed author, as Mr. Abernethy used to call him, so would I guard them, if I could, from receiving any of the few erroneous notions which may be here and there mixed up with the treasure of truth presented to them. I would therefore humbly, yet firmly, urge, that there is in Nature no such distinction between injury and disease as that implied in the passage which I have quoted.

An injury, in the common sense of the word, mechanically deranges a part of the body, and immediately (in conformity with a law in the animal economy) repair commences, which is demonstrated by certain phenomena. If the economy be sound, the execution of the law is vigorous and efficient, the repair complete; if the economy be disordered, the law is carried out with difficulty. In the former case, the wound heals; or, if the injurious influence be not of a mechanical kind, it is mitigated by some action which repels it, or relieves the system from it by secretion; examples of which are occasionally seen in transient affections of the skin or bowels. But, if the law be carried out imperfectly, then, instead of the healing of the wound in a direct and uninterrupted manner, we have suppuration, abscess, erysipelas, or mortification, or it may not heal, and the death of the patient may ensue*. So, when the system is affected by injurious influences of other kinds, which are perfectly repelled,—as cold, for example,—we have a light, transient, speedy, and salutary excitement, evidenced by increase of secretion,—from the skin, perhaps, or bowels, or kidney,—or by

* Here is, in Mr. Hunter, a clear recognition of this distinction as regards *local* phenomena. "In injuries, arising from accident, we have hitherto supposed that the parts have no tendency to any diseased action, independently of the accident; for, if they have, it is probable that such a tendency may be stronger than the disposition for restoration; and, in that case, they will fall into the peculiar diseased action, &c. Let us take cancer and scrofula as examples, and we shall find that, if a part be hurt which has a strong tendency to scrofula, it will most probably run into a scrofulous mode of action, in preference to that of restoration, &c.; or if a woman, beyond thirty years of age, receive a blow in the breast, it is more likely to acquire the cancerous mode of action than that of restoration, which should be well distinguished from what is immediately consequent on the inflammation; for on this depends a knowledge of diseases." The error here, is the reference being wholly to the *part*.

one organ undertaking the office of another, to which injurious influences may have been applied (see Sympathy); but, if the system be incapable of carrying out the preservative law thus salutarily, we have excitement, debility, fever, and those various suspensions or embarrassments of function which we call disease. This renders it necessary that, if we say any thing about the differences of injury and disease, the matter should be differently stated; and it appears to me that the truth and simplicity of another view of it are alike apparent.

Now, a wound is an injury to the body. Granted. The processes which it induces, as distinguishable from ordinary habits of the economy, are new actions; but they are not new dispositions. Whatever takes place in the part, is an effort of Nature to repair the injury: in this case, mechanical. Disease is no more than this. Some injurious influence has acted on the body; no matter whether air, food, subtile forms of matter, poisons, or what else: this is the cause of the disease. The body institutes efforts to expel the injurious influence or to repair its consequences. These efforts, *as in regard to the wound*, may be successful or abortive; but, in either case, they are the symptoms, as we call them, of disease, and by them we judge of the strength of the reparative tendency. So far as we can see, in all cases where the influence is not necessarily destructive per se, the success or failure of the effort in both cases, that is, of injury or disease, depends on the same general cause, namely, the *condition of the body* at the time it became injured.

The only difference between these two cases is, that, in the wound, the *nature* of the injury is apparent and demonstrable; whilst, in the disease, it is often very obscure, or altogether hidden from us.

In the wound, we know what those processes are which predicate success, and those which augur delay, risk, or failure; but, in disease, our ignorance frequently, and indeed generally, prevents us from discriminating between those processes which should be encouraged as indications of a preservative power or tendency, or which require, as such, adjustment in their *degree;* and those which should be repressed or subdued as presaging failure. Thus, if a wound fester, or suppurate, or become erysipelatous, or slough, I know pretty accurately the kind and extent of the departure from the preservative law of the animal economy, as presented in the successful repair of this kind of injury. But, if I have a pa-

tient with vomiting, diarrhœa, with or without morbid biliary secretions, or what not, I know not how much of it may be due to *preservative* power, and how much to the absence of this power. In this distinction consists the true knowledge of the nature and treatment of disease. Again, Mr. Hunter observes, "that injuries have, in all cases, a tendency to produce both the disposition and the means of cure, which is a circumstance not belonging to disease," &c. But this is certainly erroneous. There is no exemplification of any disease or disorder of the body, not shewing a *tendency* "both to disposition and means of cure," which does not apply with at least as much force to many, too many indeed, cases of mechanical injury. A scratch in the skin leads, in certain cases, to death, as certainly as a poison in the stomach does. The essential difference, in regard to injuries and diseases, is simply this,—that we have considerable information in regard to the one, and comparatively little knowledge in regard to the other.

In endeavouring to teach any subject embracing a multiplicity and variety of phenomena, there are usually several modes of proceeding, each having certain advantages, and certain objections. In making a selection, it will perhaps be generally best for a man to adopt that arrangement in which the several objects present themselves, in the easiest succession, to his own perceptions; since, whether this prove the best plan or not, in an absolute sense, it will probably prove so in regard to his powers of managing the subject. The subject of inflammation is so extensive, that it is impossible to say all that might be said upon it, in any work approximating to an *elementary* character: but it is very possible to say enough to give you sound and clear views of its essential characteristics, and to unfold principles on which you may found further enquiries. Now, the first thing is, to define the general nature of the subject of which we propose to treat, and the nomenclature in connection with it. Secondly, to describe the facts or phenomena in relation to it; and, lastly, *to explain the law* to which such facts are to be referred. If this be done, the whole has all the properties (both in regard to the manner in which it is taught, and the ultimate object of the lesson) of science. So far as I know, this has never been hitherto done in regard to inflammation. Much less has it been followed up by what to us is the essential thing,—namely, by shewing how the treatment should arise out of the nature of the malady. The plan is, then,—first, a general definition of inflammation, and its nomenclature; secondly,

a description of the phenomena which it exhibits; thirdly, the law to which these phenomena are to be referred; and, lastly, the treatment which necessarily arises out of it.

The term Inflammation, in its primary and simple acceptation, merely means the co-existence of four things in any part of the body;—these are, increased heat, redness, pain, and swelling; to which throbbing is generally added. This definition is borrowed from one of its most remarkable forms, occurring in situations where we have the power of seeing it; and were inflammation really confined to the phenomena involved in the foregoing definition, the discussion of the subject would be much narrowed.

In pursuing the subject, however, we find that we are obliged to employ the term Inflammation (with some modifying epithet, perhaps) in a much more enlarged sense. We find it influenced by its degree, by the part, and by several other circumstances, so that it becomes presented to us under forms so various, as to render the simple definition, with which we started, not only not sufficiently comprehensive, but, on many occasions, wholly inapplicable: and, as we pursue the subject still farther, we find inflammation, under some modification or other, operating so universally in diseases, that at last we perceive that it is more or less connected with almost every malady presented to the surgeon. Now I admit, that the first announcement of this fact has a discouraging aspect; but, like all other truths, when properly understood, it has quite a contrary character. If I mistake not, the number and apparent dissimilarity of the phenomena are the very circumstances which impel us to that mode of investigation which can alone enable us to determine the law of their occurrence.

I wish to impress this on you, because it will prepare you for what little difficulty there is; it will tend to fix your attention; it will put you early in the possession of facts, without which we cannot progress; and thus alike prevent *unnecessary* retrogressions on your part, and *unprofitable* repetitions on mine. We shall suppose, then, that a part is affected by heat, redness, pain, swelling, and throbbing, —and now, what is to come next?

RESOLUTION.

All these circumstances or symptoms, we will say, gradually subside, and the inflammation is said to end in Resolution; the part being restored to its natural condition: or

ADHESION.

If the inflammation have taken place in a wound, there is a substance thrown out on it which we call coagulating lymph; vessels shoot from the opposing surfaces, and the wound unites: or

SUPPURATION.

The inflammation becoming greater; that is, either occupying a greater district, or having its characters more strongly developed, or both; is attended by the formation of matter (abscess); and then those portions of the cavity of this abscess which do not immediately adhere on being emptied of the matter, are healed by a new structure, deposited in the form of little, red, fleshy-looking specks (granulations), on a raw surface thus left: or

ULCERATION.

This surface does not heal, but a sore remains, more or less red; perhaps discharging matter: or

MORTIFICATION.

Sometimes the skin, and the parts immediately beneath it, are rejected altogether from the system, having undergone a previous change, as if they had been rotten, and wholly unlike their original appearance.

These are regarded as the terminations of inflammation, since all others are easily referrible to modifications of one or other of them. Some parts become thickened; but this is only a greater effusion of that coagulating lymph which produces adhesion, and so on. If inflammation be active, circumscribed, and run quickly into suppuration, we call it phlegmonous; if it be diffused, and the suppuration be mixed with other things, hereafter to be described, we call it erysipelas. Then we have other names, which we apply to certain inflammatory appearances; but those mentioned will be sufficient for our present purpose. We will now, then, consider inflammation under its most simple form, and then proceed to some of its more striking examples.

As our object is to observe Nature in an unembarrassed ex-

ercise of her powers, we must take a case as little disturbed by disease as possible; and, in civilized communities, this is not very easy in the human subject. Indeed, it can only be done with reasonable confidence when we select a healthy subject: a wound, which is not, by its extent or severity, calculated to disturb the animal œconomy; or which has been inflicted intentionally, as in an operation, with a previous endeavour to put the health in a quiet condition. For obvious reasons, also, when the choice is open to us, and all other things are alike, we should let our case be one in which the operation has been undertaken for the removal of some disfigurement, rather than for the extirpation of disease. For carrying out these objects, a wound by a sharp-cutting instrument, as doing the least violence, should be preferred. Now, then, to observe the obvious phenomena. In the first place, there is bleeding and pain; then the bleeding gradually ceases, and the pain becomes mitigated. We will now suppose that we have brought the edges of the wound into contact, with the exception of a few points, at which there is a small interval still remaining. The wound now feels pretty comfortable; there is little or no pain: but there comes on a feeling of increased heat, there is some sense of throbbing in the part; and, if the wound, or the skin in its immediate vicinity, be touched, there is some alteration in sensation; that is, the part is rather tender; and, if it be the finger, there is some impairment of the sense of touch. Thus, a body is more apt to impart to it a *general* notion of hardness, softness, or what not, than a perfectly accurate and well-defined perception of its physical or mechanical properties. Moreover, the part is also a little red and swollen.

Now, if we continue our examination, we find that, at the end, we will say of about twenty-four hours, those parts of the wound which were in perfect contact, are united; and we recognize the line of union exhibiting, perhaps, the smallest possible appearance of moisture. The spaces where sides of the wound were not brought close together, afford much of the same appearance as yesterday, except a little dryness from evaporation. On the adjacent edge, however, we see a faint redness; and soon there appears a thin, semi-transparent sort of secretion, which, about the third day, assumes the following characters. It is yellowish-white, cream-like, somewhat unctuous to the touch, usually inodorous, or somewhat mawkish in smell, though sometimes fetid. This is what we call matter or pus, and the production of it is suppuration. This secretion increases; but, in the case before us, amounts

to scarcely a greater quantity than is sufficient for a liberal dressing to the part it covers. Any coagulated blood, or dried matter, is generally loosened, and the discharge now begins rather to diminish. The cut surface becomes level and smooth, and represents a congeries of little red, pointed, fleshy-looking bodies, which, first peeping up through the matter, now occupy the surface. We observe also, around the edge, a grey slate-coloured line, which we find to be a delicate pellicle of that which is to be the new skin. The wound now heals; and, as you observe, from the circumference to the centre; and the part is, in a few days, restored. As it heals, the wound becomes more and more contracted, and the contraction continues even after the healing is completed: the effect of which is, that when all the processes have ceased, the space represented by the scar is so much less than that occupied by the wound, that no person, without previous information on the subject, would form any idea of a wound by the measure of the scar or cicatrix. Now these are but sketchy shadowings, as it were, of the important process which we are considering; but, nevertheless, they are truly phenomena of inflammation. We have had heat, redness, pain, swelling, and throbbing—very slight, I grant you,—no disturbance: in fact, we have nothing to say but that the wound healed. Now we will go back, and suppose the same wound in another person; which proceeds in the following manner.

In the first place, we find that the parts brought together do not unite as in the other case; that the swelling, heat, pain, and throbbing, are greater; that the tenderness is considerable. The wound festers, as it is said. We put on a poultice; we direct the part to be kept quiet. The general swelling seems greater in a particular spot; we feel that it is elastic. We say that there is matter there, and, either allowing it to find its own way, or letting it out by a lancet, the pain, throbbing, &c. subside; the little cavity occupied by the matter collapses, and its sides unite by adhesion; or, perhaps, some portion of it unites by granulation, in the way I mentioned in the former case, in regard to those parts which had not been brought into contact. We here observe that the part is repaired as before; but its reparation has occupied more time, and has been accompanied by more suffering; there has been more matter; its secretion has been attended by different circumstances (there was no confinement of it, or abscess, in the former

case); and we remarked also, that the patient seemed even a little disturbed, generally, by the pain, &c. of the whole proceeding.

Before I put a third case, it may be as well to speak of matter, or pus. As I have said, it is a whitish-yellow, cream-coloured fluid, unctuous to the feel, and emitting little odour: examined by a microscope, it appears to be composed of globules, swimming in a fluid, coagulable by muriate of ammonia.

The time required for the secretion of this pus is uncertain; sometimes it is secreted at once, as pus; but, more commonly, it is preceded by the secretion of some other fluid, which differs from pus so far that it does not contain the same number of globules; these are more transparent, and the fluid in which they swim is not coagulable by muriate of ammonia. This last circumstance *seems* peculiar to pus; but the point has not been satisfactorily examined. Several cruel experiments have been made on this subject. But the best, I think, involved no cruelty at all; whilst it had the advantage of being made on the human subject. This was one of those made by Sir Everard Home; and consisted in watching and examining, first the serum, and subsequently the other products of the inflammation excited by a blister on a young man's chest.

The chemical composition of pus has not, I think, been accurately determined; nor does this mode of enquiry seem very promising in regard to any information which it is likely to give us as to the laws of its formation. Mr. Hunter made some experiments by dissolving pus and several other forms of animal matter, such as tendon, muscle, and white of egg, in acid, and then precipitating the solution with alkali; but the examination of the precipitates shewed nothing particularly different in either case: all yielded a sort of flaky substance. He also reversed the experiment, dissolving the animal matters in the caustic alkali, and precipitating the solution by muriatic acid; but the precipitates, examined by a magnifier, shewed no perceptible difference in character. Albumen, fatty matter, various salts, &c. are found as constituent elements in pus; and it seems that the fluid coagulable by muriate of ammonia, is more abundant in healthy pus than in some other of its numerous varieties; but little is known of any value on this subject, and therefore I shall not enlarge on it. The uses of pus will be adverted to when I consider the law under which inflammation seems to occur. The distinction between pus and mucus have also been made the subject of much consideration.

Pus is specifically heavier than water, in which it therefore sinks; whilst mucus, being lighter, floats, and so on: but neither this, nor any other distinction between these fluids, is important, because the surfaces which can secrete mucus, can also secrete pus. The irritation or disordered action giving rise to the secretion, is always the thing to be considered; and this we judge of very imperfectly, by the *mere* examination of the product.

This investigation is usually regarded with interest in affections of the lungs; but, if the mucous membrane of the respiratory organs can secrete pus, of which there can be no doubt, it is obvious that any attempt to determine the seat of the disease, whether in the substance of the lungs, or in the lining of the ramifications of the windpipe, by the characters of pus and mucus, must be unavailing*.

We regard pus, possessing the above peculiarities, as good or healthy, because they are such as characterize this secretion when produced by actions that are healthy or reparative. Nevertheless, you may have good pus, as far as its physical appearances are concerned, without actions which are obviously reparative. Pus is secreted in abscesses, from ulcers, from torn surfaces, and also without previous injury, and, under certain circumstances, from every surface in the body. It is true, that in the skin there are always accompanying processes, which involve, at one period or other, lesion of the surface. But secretions also take place under circumstances somewhat similar to those under which "good pus" is secreted; which, not answering the description I have given, induce us to admit the term puriform: and, in this sense, pus exhibits a great variety of characters, most of them being very different from those which it usually presents. Fœtor is one of them. The matter may exhale a most offensive odour, and this of great variety; nor is the presence of offensive odour necessarily prohibitory of the progress of reparative processes.

I think the most insupportable odour I ever recollect to have met with, was from an apparently healthy granulating surface, subsequent to a severe laceration. Occasionally, particular forms of disease evince characteristic odours in their secretions. This is usually the case in inflammation attending cancer, in certain destructive sores (technically termed sloughing phagedena), and

* We are indebted to Mr. Hunter for shewing that pus is a secretion not necessarily implying any destruction of parts; the idea, previous to his time, being, on the contrary, that pus, somehow or other, resulted from a conversion of solid parts into that fluid.

perhaps in sores the result of the abuse of mercury. But we must be careful in regard to this point: the odour does not seem a very essential circumstance; for I have known many scrofulous sores exhale an exceedingly offensive and peculiar smell; yet I have witnessed the very same smell arising from sores where there was no reason of any kind to suspect the existence of scrofula; and so, indeed, though less frequently, of the other diseases of which I have spoken.—Consistence. Then, again, the secretions from surfaces under inflammation are very different in their consistence. Sometimes, with the general characters of pus, they are unusually thick; at others, they are streaked with blood; at others, again, we see flocculi floating in them like broken-down cellular tissue; and, occasionally, we observe shreds of cellular tissue mixed with them. Sometimes we find matter of this kind to be much thinner than good pus; and, in some cases, quite thin and transparent. I once opened an abscess, and let out a quantity of ordinary yellow pus; the abscess filled again, and being again emptied, the fluid was straw-coloured, and perfectly clear, like pale sherry: this, however, in abscesses, I apprehend to be rare; but aqueous secretions are common enough under a variety of other circumstances, especially in unhealthy ulcers. Ordinary pus seldom irritates the surface which secretes it, or that in its vicinity, unless it be suffered to accumulate; but when the secretion is thin, it is often highly irritating, and even excoriating to the surrounding parts. Occasionally, also, the secretions from diseased surfaces are discoloured, being more or less bloody and thin at the same time. Thus we speak of a bloody sanies and thin ichor, as descriptive of these aqueous or discoloured products. A number of other appearances, intermediate between those which I have mentioned, are also observed; but, for purposes of description, they may usually be ranged under one or other of the foregoing varieties. The only point on which they agree is (what on all subjects it is most important to remember, as generally pointing, in some way or other, to their true relations to the laws of animal œconomy), that they are all alike new products, such as we never find in a natural state of the body. Therefore it is clear that they are superpositions, and of course that some purpose is answered by them. What this purpose may be, must be considered as we proceed.

I shall now, then, revert to our original wound; and suppose that, in a third person, it is followed by results again different from those which I have hitherto supposed. The wound, then, as

in the second case, does not unite; the redness beginning in a small district, extends,—nay, it creeps, as it were,—up the limb, until it occupies the whole of it: there is great pain, heat, throbbing; the member becomes enormously swollen; the patient is exceedingly disturbed; he is thirsty, his tongue foul and dry, his pulse much accelerated; perhaps he may have pain in the head, even proceeding to delirium. Little blisters form on certain parts; these are followed by a darkening of the surface, which breaks, as it were, discharging a strange mixture of pus, more or less perfectly developed, mixed with blood and shreddy cellular tissue. A large portion of skin, having undergone a curious alteration, is mortified, as we term it, and is thrown off from the surrounding parts; the absorbent vessels isolating it from them by removing the connecting surface. Now, or perhaps a little time previous, certain measures are adopted, and the patient slowly recovers; or, in other cases, disturbance of the head continuing, there is muttering delirium; and though a great excitement and frequency of pulse may continue, still the patient's tongue becomes very dark, and even black. The pulse loses all evidence of excitement, except its frequency, and the patient sinks, and is said to have died of inflammation, which we call erysipelas, or phlegmonoid erysipelas.

In the four preceding cases (which, though here put hypothetically, are, you must understand, of frequent occurrence in practice, as I shall by and by exemplify), we observe very different sequences following a clean cut with a sharp instrument. And had I begun by supposing that the injury were a slight scratch, or, indeed, inflicted in any other manner, I should have had to tell you the same story in all essential points; that is, I should have had to relate successful repair of the injury, a repair more slowly accomplished, and a case in which no repair took place. Now, at first sight, we might be disposed to regard these various sequences as the necessary result of local injury; but you must not do this; all I wish you to do at present, is, to note facts, which cannot be mistaken; namely, that the circumstances in question followed certain local injuries, in the severity of the local characters of which we could distinguish no difference. We shall immediately get into difficulty by regarding them as effects *necessarily* resulting from the wound in either case; because we find that they sometimes occur without any wound or local injury at all.

In supposing the wound in the integuments of the body, and

in stating that the various results which followed it in different cases, occurred in others without any wound at all, I should observe that there are a multitude of inflammations of the skin, very different in appearance from any of these; and that the whole catalogue of diseases of the skin are but modifications of inflammatory actions, resulting from causes to which I shall advert as I proceed, but which are altogether independent of local violence or injury. Here I only make the remark as preliminary to the statement of the terminations to which inflammatory actions of the skin seem to be disposed. It must be remembered, that inflammation in any part may be accompanied by adhesion, suppuration, effusion, thickening, ulceration, or mortification; and that when we talk of the disposition of parts to this or that process, we speak, generally, as supposing the inflammation to have considerable range of degree, short of extensive violence, and all other things being alike. In this view of the matter, then, we must regard the tendency of inflammation of the skin to suppuration, as its leading character; but scarcely, I think, in so striking a manner as the dispositions of other parts are presented to us. We should be nearer the mark if we were to say, effusion; and to regard suppuration (as indeed, but for conventional objections, we ought to do) as one example of it. The truth is, that no surface of the body presents examples of inflammation in such endless variety of form or severity, as the skin; so that, amidst such a number and complexity of actions, we cannot adjust their tendency with the same ease as in other parts. The skin is not only thus the seat of innumerable actions in itself, but it becomes more frequently involved in actions which do not commence in it, than any other organ. Of these, abscesses, boils, carbuncles, &c. are examples. Of the two latter I shall speak, as distinct subjects, in the present volume.

I would say a few words, by way of definition, of a common abscess. A change of sensation takes place in some part of the body, varying from slight uneasiness to acute suffering. The part feels tender, and is observed to swell. This swelling increases; the skin becomes more or less red; the swelling feels somewhat elastic in its central part, but hard and firm at its circumference. The redness of the skin, the pain and tenderness increasing, sensations of throbbing are felt in the part; the swelling is now observed to be more or less of a conical form (the abscess is said to point); and the skin, at or near the apex of the cone, is observed

to become thinner; the elasticity, already felt, has gradually been developing a sensation, which is now clearly that resulting from the fluctuation of a fluid. If nothing be now done by art, Nature continues to thin the skin at or near the point of the cone, which, being at length entirely removed at that point, nothing but the cuticle or scarf-skin remains; and, this bursting, the matter is discharged. The patient, who all along had experienced nothing but increasing pain, is all at once easy. The abscess discharges its contents; its sides coalesce, all but a small wound, the natural enlargement of the original aperture through which the matter has escaped; and this is healed by granulation, and the subsequent superposition of new skin, as I have before mentioned. The discharge from the abscess we suppose to be healthy pus, as it is called; but it may present any of its multiform varieties. In such a case, the abscess is said to be a common abscess; the inflammation, common inflammation. The thinning of the skin is evidently calculated to bring the matter to the surface; and the hardness of which I spoke as characterizing the circumference, is found to be the result of adhesion of the skin to the subjacent parts, calculated, as we think, to limit the extent of the inflammation; because, when we find it absent, the inflammation has no natural line of demarcation, but spreads in any and every extent and direction,—of which erysipelas is an example. You see, then, that the inflammation, which produced suppuration in the central part of the abscess, produced adhesion only at the circumference, as was remarked by John Hunter.

Now, as I shall have a great deal to say, some time hence, on abscesses, I shall merely observe, at present, that you may have abscesses with various degrees of what we call the signs of inflammation (heat, swelling, pain, redness, and throbbing), or you may have them of any magnitude without any of these phenomena being perceptible. As these abscesses are in general a long time in forming, and a long time in being got rid of, and as they may exist for a long time without augmenting any apparent disorder, we say they are chronic abscesses. Of many, we are able to see the use; as when an abscess forms over foreign bodies, as over dead bone, and heals immediately on the expulsion of the offending body. But, of the causes of others, we are often very ignorant; although I hope to be able to throw some light on the subject as we proceed.

Let us now further consider inflammation as modified by its seat, or by the structure in which it occurs.

MUCOUS MEMBRANES.

The surface next in continuation with the skin is the lining of the various canals of the body; which linings form what we term the mucous membranes. That covering the throat enables us to see what happens in inflammation; and further enquiry shews it to afford a very good type of the results by which the disposition of these structures, when inflamed, is characterized. A man has a sore throat, as it is called: he feels his throat stiff; swallowing is painful; the membrane seems to have its extensile property impaired; it is tender also. If we look at the throat, we shall see differences according to the degree of inflammation. The throat may appear red throughout; and this, with a slight spot or two of increased secretion, more or less like pus or mucus, may be all that we can see; or we may perceive, in addition, a large quantity of yellow secretion, or an ulcer, or many ulcers, secreting pus;—nay, we may see a surface of slough or mortification;—but, if we examine a thousand cases, we shall never see any other than some variety of degree or combination of the circumstances which I have mentioned. In almost all, except those of very trivial degree indeed, we shall see the secretion of pus, or such an increase and alteration of the mucous secretion of the part as are not distinguishable from pus; and, if the inflammation be only moderate in degree, we shall usually observe more or less ulceration with this increased secretion. Now, whether we examine the lining of the wind-pipe and its ramifications, that of the stomach and intestines, the bladder, urethra, and vagina, or that covering the white of the eye, all of which may be regarded as mucous membranes, we shall observe little essential difference in the actions to which their dispositions tend, when the respective parts are affected by inflammation. That is to say, that mucous membranes shew a ready disposition to increase their usual secretions, or to secrete matter, and to take on the process of ulceration; but that they evince very little disposition to adhere together.

You must not suppose the appearances of all mucous membranes under inflammation are identical, or that you would not see differences between a piece of that lining an intestine, and of that lining the wind-pipe. Nevertheless, their modifications, in appearance, are not essential differences; and they depend more on *natural* diversities of appearance than on particulars *superadded* by inflammation. Neither are you to imagine that the fact of various struc-

tures evincing an inclination to this or that mode of action, when inflamed, is at all inconsistent with their ability to assume any other under peculiar circumstances. Thus, if we take a mucous membrane, we find it lining a cavity, which it is of the utmost importance should be kept open, and which a tendency to adhesive action would, of course, tend to close; so, if we take the serous* membranes, of which I shall speak in the next place, we find them also lining cavities, as it were—the abdomen or chest, for example, —but with this essential difference, that the object here is, on the contrary, to keep the cavity closed. So we find their tendencies in disease in beautiful harmony with their functions in health: the mucous linings of canals presenting very little disposition to adhesion; whilst, in the cavities lined by serous membranes, the least opening has always a tendency to effect its own closure by the adhesive inflammation which is excited.

Yet, under violent actions, these peculiarities, like many others we know of, may be interfered with, and the power of evincing them annulled; so that, in certain cases, we see the contrary of all this. That is, we see the sides of canals united more or less closely by bands of coagulable lymph thrown across the tube; and, on the other hand, we see the serous membrane departing from its ordinary habit, and secreting large quantities of matter, as in the chest, constituting what we call empyema†. These, however, are exceptions which only serve to mark the rule, and to improve our knowledge, as we shall see, of the resources of the animal œconomy. I would observe, that mucous membranes, notwithstanding their readiness to secrete pus, when inflamed, generally commence by increasing their usual secretion, with some little alteration, perhaps, of quality, and that the assumption of the puriform character is gradual. This is useful as helping us, amongst other things, to adjust the real value which is to be attached to those rules, or endeavours at rules, by which we are told pus is to be distinguished from mucus.

Now, I have spoken most particularly about mucous and serous membranes; because, whatever you know in relation to these parts and the skin, to which I have also directed your attention, relates

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* Those which line cavities and give investments to the organs which those cavities contain, as in the skull, chest, abdomen, &c. and their respective viscera.

† This was one of the demonstrations used by Mr. Hunter to shew that pus might be secreted, the surface secreting it remaining unbroken.

not only to the most frequent seats of inflammation, but also to the most important exemplifications of it which occur in practice. It involves, in fact, inflammation of the membranes of the brain, heart, and lungs; of the viscera, of the abdomen, and pelvis, besides the linings of the various viscera; and, at least, one very important class of diseases of the eye. In regard to other structures, as influencing the course of inflammation, I need say nothing farther than that all parts highly organized,—that is, with large supplies of blood-vessels and nerves,—seem most inclined to adhesion to the surrounding parts, and to suppuration; whilst parts with but small blood-vessels and nerves, like bone, ligament, and gristle, seem very readily to run into ulceration and mortification; and, although they severally exhibit respective peculiarities, yet this is, in a general sense, true of them all.

There is one part of the body which is peculiar—I mean the gums; that is, they are very vascular, and, when healthy, very insensitive. Their vascularity seems to prevent them from becoming often inflamed, since they bleed so readily; but suppuration seems their leading disposition when inflammation really does take place: though occasionally they exhibit unusual powers of adding to their natural structure (hypertrophy).

FURTHER REMARKS ON SEROUS MEMBRANES.

In examining inflammation, then, as it occurs in Nature, we will proceed to other exemplifications of it. A person is wounded in the abdomen, and recovers. In this case, an opening is made into a cavity presenting a large surface. Inflammation is set up around the aperture; the intestine, corresponding to that part, is surrounded by a circle of coagulating lymph, which, becoming organized, glues the parts together, and thus shuts out, as it were, the district of the wound from the general cavity. The healing of the external wound is not different from any other: such parts as are brought into contact unite at once; those which are more or less separated, at first secrete matter; then granulations grow up, and, gradually filling up the part, become covered with skin, as I have already mentioned.

In another case, we observe very different results. On the infliction of the wound, and the consequent exposure of a portion of intestine, the patient is faint; he feels cold; his pulse is low: all this may have happened in the former case. His condition, how-

ever, changes; pain arises perhaps in the district of the wound; and this gradually, but rapidly, extends over the whole abdomen. The whole surface is exquisitely tender; his pulse becomes rapid, though, perhaps, small in volume. His stomach rejects every thing; his bowels do not act; he has the excitement of fever; he sinks, and dies. We examine his body. We find the intestines sticking to each other, and also to the opposing surface, perhaps in an irregular manner, as did such portions of them, in the other case, as were in the immediate vicinity of the wound of the cavity. The surfaces of the intestine, as well as the extension of the same membrane (peritonæum) which lines the walls of the cavity, are traversed, in various directions, by vessels exhibiting a redder appearance than is natural. There is a good deal of yellowish, thin fluid effused into the cavity of the abdomen; and flakes of a yellowish, soft, and adhesive matter (coagulating lymph), varying in size, are adhering to the surfaces of the intestine, and to that to which they are opposed. This is, indeed, a state of things apparently very different from those in the case which did well, and still more so from the first case we supposed of a simple wound from a clean-cutting instrument. The one presented us with little more than a gradual and perfect restoration of the injured part; the other produced effects far away from the local injury, and ended in the death of the individual. Yet they are but magnified views—literally, extensions of the same process.

Now here I again caution you in regard to the wound being considered as the *necessary* cause of the sequences on it, and for the same reason as before; namely, that all these sequences are seen to occur without any wound at all*. Again: you see that the wound has been the same, so far as we can perceive, in both cases; yet how different have been the results! A man may get wet in his feet, come home, shortly feel himself shivering and ill, and have inflammation of the peritonæum come on, which is, in fact, what I have been sketching to you in the fatal case: yet here

* So if I speak of universal inflammation of the peritonæum, following what we call strangulated hernia—that is, where the aperture through which the intestine has protruded girds the intestine, embarrassing its circulation, and producing inflammation—the same remark applies. The truth is, that the same inflammation which followed the wound in the one case, and the mechanical violence consequent on the constriction or the hernia in the other, occurs in other cases, not only without a wound or a hernia, but without any perceptible external impression whatever, although I am not forgetting that cold is an external impression.

again you have thousands get wet feet without any such consequences. All this must be considered.

I may now, then, observe that these appearances, which I have marked as characterizing inflammation of the peritonæum, present the *type* of the appearances which usually characterize inflammation of this kind of structure. We call it a serous membrane; and we apply the same name to one of the membranes which invest the brain, the arachnoid (so called from its thin, spider's-weblike appearance), to the pleura, which covers the lungs and lines the chest; to the peritonæum, of which I have spoken, and which covers all the abdominal viscera; to that which immediately invests the heart, the serous layer of the pericardium; and to that which contains the testis. They are all capable of sticking together (adhesion), of producing pus (suppuration). Sometimes they simply adhere; sometimes they pour forth pus without adhering; and sometimes they exhibit a mixture of the two, as in the case of the wound of the belly: but we always observe a great tendency in them to stick together in inflammation; and, as we observe this as an absolute character, and still more remarkably when we consider these structures in relation to others already mentioned, we say, when we speak of the tendencies of inflammation (terminations, as we technically call them), as modified by structure, that the tendency of serous membranes under inflammation is to

ADHESION.

So striking is this, that, for one case of inflammation of a serous membrane, presenting us with any other appearance than increased vascularity, and adhesion of its opposing surfaces, by effusion of coagulating lymph, we meet with very many where the morbid appearances are confined to these phenomena; and this, too, whilst exceptions are by no means so unfrequent as to be uncommon. The lungs are constantly found adhering, by means of their serous investment, to one or more points of the chest; often universally adherent, the play of the lungs having apparently led to an elongation of the connecting media. Now we often, it is true, find effusion of water or matter into the chest, with and without adhesion; but then there is no proportion in their frequency to the occurrence of adhesions. So with the heart: we find this organ adherent, either partially or generally, to the membrane which covers it. The connecting medium (lymph) is deposited in a variety of forms; sometimes gra-

nulated, at others of a reticulated texture, and so on; but we do not find the other terminations of inflammation, except in rare instances, effusions of water only excepted. These, too, when the effusion can be properly set down as a morbid appearance—that is, as existing before death—are perhaps hardly so common as we imagine them to be. Adhesions, on the other hand, I apprehend to be much more so. As I must hereafter dwell more at length on these subjects, I will merely state that what I have observed with regard to one serous membrane, mutatis mutandis, applies to them all.

We take advantage of this tendency to adhesion in some cases. When we wish to obliterate a cavity lined by a serous membrane, we have nothing to do but to excite inflammation (supposing that it can be done without danger), and the sides of the cavity adhere; that is, the cavity is obliterated. I must, however, remark that there is another change to which serous membranes are quite as prone as to adhesion; and this is opacity. It is important to recollect this, and chiefly for two reasons: the one a general one, the other referring principally to an individual organ. In many instances of disturbance about the head, the only testimony we discover of inflammatory action having existed is the opacity of the serous membrane of the brain. And in the eye, when vision becomes impaired by causes affecting the eye as an optical instrument, it is by the combined agency of the tendencies to adhesion and opacity which I have mentioned. Parts adhere together which ought to move freely and independently; and transparent structures become opaque. Thus the pupil, which naturally enlarges and diminishes according to the intensity of light, becomes fixed, by the adhesion of the membrane which covers it, to the capsule of the lens which is just behind it; and the capsule itself is rendered opaque, forming what is called capsular cataract. The transparent lens which the capsule encloses becomes also opaque (lenticular cataract); or the same thing takes place in the transparent cornea*, forming another and often a much more irremediable embarrassment to vision. The use of knowing all this is in the promptitude and vigour which it necessarily engenders when these parts are under inflammation.

Another circumstance observable in inflammatory disturbance of serous membranes, is their disposition to effusion of aqueous fluid. Of this, water in the brain (hydrocephalus), in the chest

* Which, however, is not a serous membrane.

(hydrothorax), in the pericardium (hydrops pericardii), in the abdomen (ascites), and common hydrocele, are familiar examples. Still adhesion and opacity seem to be the leading primary dispositions. The joints are lined by a membrane, not perhaps identical with those which we call serous, but certainly presenting more of analogy with those than with any other structures; and all other things (that is, the degree of inflammation and the persistence of disturbing causes) being alike, we find their dispositions under inflammation similar to those of serous membranes, but perhaps, by reason of the structures with which they are connected, not practically exemplified so strongly.

For reasons which will appear when I speak of the treatment of inflammation generally, I shall say a few words in regard to the management of its several processes now: and first of adhesion. The management of this process will be varied by the consideration that our object is sometimes to further its accomplishment, at others to prevent its occurrence. When Nature produces adhesion between parts, we observe—first, that they are in contact; secondly, that there is little or no motion between them; and, thirdly, that the adhesion is certain and steady in proportion as the inflammation is of moderate character; that, if the inflammation be actually put a stop to, nothing happens but resolution,—as sometimes occurs in the chest and abdomen.

We further observe, that bruised surfaces will not unite like clean cuts; but that the bruised surface must be changed; and that bringing parts, which have suffered an injury of this kind, into contact, is useless. If contact be the desirable condition for adhesion, then any intervening body must be evidently calculated to retard or prevent that process. Hence all foreign matter, as gravel, glass, dirt, sutures of silk, &c. must be removed, or dispensed with as much as possible. Now what we do in actual practice arises naturally and simply out of these observations of Nature's processes. All that farrago of balsams, &c. which infested the practice of surgery, and of which we see remains in farriery, is exploded. When we wish to heal a wound by adhesion, or the "first intention," as it was technically termed, we bring parts together, whenever we can do so without stretching them; and this, partly by position, partly by approximating the edges by sticking-plaster. We then apply a little cold water, if the part seems becoming very hot, to regulate its temperature, and to keep the excitement moderate. If you chill a part, or entirely subdue inflam-

mation, adhesion will not take place; because adhesion cannot occur without *some* inflammation. Then we remove all foreign bodies; and, for the same reason, never employ sutures, or sewing up of wounds, except it be where we gain more, as regards the whole wound, than we lose by the foreign body we partially interpose; as in hare-lip, and large wounds of the skin, where it is loose and abundant.

Here the ordinary method of bringing the parts together by sticking-plaster is inefficient, not affording sufficient resistance to counteracting forces, as the muscles in the case of hare-lip: there are also situations in which plaster cannot be conveniently applied. In such situations, the bringing of the wound together in one or two points, by means of a thread, will often enable us to bring the surfaces of the whole wound into contact—an advantage which more than counterbalances the interposition of a foreign body (the thread) at one or two minute points of it. We thus practically retain, in a few cases, such as those which I have mentioned, and in the analogous ones sometimes furnished by accidents, the *sutures* of the old surgeons. Generally, we avoid them as much as possible.

Mr. Hunter's experiments will furnish you with some interesting examples of adhesion, which (as you will of course read his works) I need not repeat here. The Taliacotian operation, that of making a new nose, is an application of adhesion.

Some other phenomena, in connection with adhesive inflammation, require to be noticed, because they shew that it has a preservative tendency; and that the disposition to adhesion is most marked where it is most required. It is also interesting to observe, that, *cæteris paribus*, all parts have an especial disposition to take on this process, when inflamed, in some proportion to the otherwise healthy condition of the œconomy at the time.

All inflammations on the surface of the body which we are accustomed to regard as healthy,—that is, as co-existing with an otherwise sound state of the system,—are attended by adhesion; and, in inflammations which produce suppuration under such circumstances, there is almost always adhesion at the circumference of the inflamed district. We infer the beneficial tendency of this arrangement from several facts; but those which have more direct reference to inflammations at the surface are chiefly three: first, we see it exemplified in subjects who are the most healthy; secondly, we find that the inflammation does not extend beyond such

adhesion; and, thirdly, when no such adhesion occurs, we see the inflammation spread indefinitely; involving, therefore, a greater extent of mischief, and frequently endangering, and sometimes destroying, life itself; as in some examples of erysipelas. I should observe to you, that, however ignorant we may be of the exact mode in which inflammation becomes thus limited, by that which takes place in the circumference of inflamed parts being of an adhesive character, we know thus much: that the interposition of a different structure always seems to impede the progress of inflammatory action; in other words, that inflammation spreads more rapidly through parts of the same structure which are mechanically continuous than where the continuity involves parts of varying structure. Now, the adhesion of which I have spoken forms a new structure by the effusion of coagulating lymph.

The adhesion of the surfaces of those membranes which line the important canals of the body tends to prevent inflammation from pervading the great extent occupied by them; and, at the same time, keeps the cavity shut. The fact, that the interposition of a new structure, or any other destruction of continuity, tends to arrest the progress of inflammation, is illustrated by certain factitious means, employed with more or less success, apparently on this principle. Sometimes the circumference of an inflamed part has been destroyed by caustic, or has been compressed by ligature; producing, in the one case, an interruption of continuity; in the other, a different condition of parts between those inflamed and those not yet affected. When parts are united by adhesion, which have been forcibly separated by incision, and subsequently brought together, it has been made a question, whether the vessels at once unite, or do so by the previous interposition of coagulating lymph; but to say nothing of the fact, that the determination of this question seems very unimportant, even were it in our power, there appears no reason for supposing that adhesion takes place, in this instance, by means at all different from those by which it ordinarily occurs. A clot of blood may be the temporary medium, or it may be the nucleus for the organization which, in other cases, is developed in the coagulating lymph effused. But, as Mr. Hunter observes, the leaving blood in the wound is not necessary; in fact, it is to be regarded as "rather *immaterial* than *advantageous*;" since, the coagulating lymph being the part of the blood required, it necessitates the removal of the other constituents of it, which is the superaddition of a process in itself unnecessary; and, as it may

be allowed to escape through the wound, it has, as far as it goes, a tendency to separate it; whilst, if it be absorbed, it is imposing an unnecessary duty on the part.

Mr. Hunter proved that the coagulation of effused blood became, in certain cases, the nucleus for new organization, by injecting vessels going into it. This was doubted by many, notwithstanding that there is a preparation which demonstrates the fact. However, last year, there was a recent specimen, proving this fact, shewn at one of the meetings of the Royal Medical and Chirurgical Society. I shall only add, that, when surgeons wish to ensure adhesion, the chief things to be regarded are, proximity of the parts it is proposed to unite; inflammation, extremely moderate in degree; and as healthy and tranquil a condition of the œconomy as the particular circumstances place within his power.

The Taliacotian operation has been before mentioned as affording an instance in which the process of adhesion is made available in practice. A brief description of this operation may not be improper. The integuments are first dissected off from the district which had been occupied by the nose; a piece of skin, of a size and form calculated to fit the raw surface, is now dissected from the forehead; and, being separated entirely, except by a small slip towards the nose, is turned downwards, and applied to the surface above mentioned. The parts adhere, and, in many cases, the previous disfigurement is rendered much less remarkable.

What is called the radical cure of hydrocele is also a good example of adhesion. Fluid collects in a cavity lined by a serous membrane; we let out the fluid; we inject port wine and water, or some other stimulant, to produce inflammation; and adhesion of the bag takes place; its cavity is obliterated.

If the inflammation appear to be wholly subsiding, we make the patient move about, to favour its excitement; if it threaten to be severe, we enjoin rest, and adopt other measures to moderate it (as you will see in the proper place), and we seldom fail to produce the result we desire. If, on the contrary, we wish to prevent adhesion, we do just the contrary of all this; so far at least as is necessary for the purpose: but this is very simple, for the only measure necessary is, to keep the surfaces from coming into contact. Setons, and, in a modified sense, issues, are examples of this. Nature makes a sort of issue herself, in many cases; and one way in which she accomplishes it, is, by forming a canal (fistula), and lining it with a structure, not distinguishable from

a mucous membrane; the propensity of which, under inflammation, is, as you know, to suppuration, *not* adhesion.

SUPPURATION.

Our endeavours at the promotion or prevention of a tendency to suppuration resolve themselves respectively into measures calculated to arrest or continue the inflammation. Thus, where we wish to produce suppuration, we adopt measures of an irritating kind; and when we wish to prevent it, we resort to those of a contrary character. The latter refer to that mode of proceeding which will be spoken of in connection with the general treatment of inflammation: the former usually involve those which stimulate the part. Practically, our interference, with regard to these objects, is governed by the nature of the situation in which the process occurs. On the surface of the body, we seldom interfere very actively to prevent any tendency to suppuration; the surface of the eye only excepted; whilst, in all other parts of this organ, and in every organ or surface of the interior of the body, we know that suppuration is in the highest degree dangerous; and, therefore, our utmost endeavours are always employed to cut the inflammation short of producing this process. On the surface of the body we interfere, as I have said, but little; and when the tendency to suppuration is unequivocal, our endeavours, almost without exception, are directed to relieve the pain, and to expedite the discharge of matter. When the process goes on without disturbance, we content ourselves by regulating the temperature of the part; and this chiefly by the application of poultices. If the action be vehement, we put on an evaporating poultice of bread and water, which regulates the temperature, and eases the patient, without interfering with the suppuration; whilst, if the case be doubtful, as to the suppurative tendency, it is a measure essentially anti-inflammatory, as carrying off heat from the part, and in facilitating the tendency (and, in fact, often determining it), to resolution. On the contrary, if the inflammation be indolent or stationary, and we desire to determine the action to suppuration, a greasy poultice is a better application; for it is soft, and comfortable by its warmth, and does not tend to repress the attempt at suppuration by abstracting heat from the part. It is important to distinguish between these intentions in applying poultices. Mr. Abernethy knew and taught their importance; but I am sorry to observe, that little attention is paid,

in many instances, to the very simple and obvious distinctions on which he very properly used to insist, with respect to these applications. We now see all sorts of poultices employed indiscriminately, as if heat and moisture, evaporation, &c. were nothing, instead of being agencies through which some of the most important laws of Nature are manifested.

ULCERATION.

When the discharge of suppuration is not immediately and progressively followed by the healing of the wound of the surface, Nature does one of two things. If the matter continue to be secreted from any depth, she forms a pipe for its conveyance to the surface. She lines this pipe with a smooth, secreting surface, from which matter is elaborated; and we call the canal thus formed, a fistula. If, however, the matter have not to travel from any depth, and the surface do not heal, we have a surface without skin, presenting very different appearances in different cases; and this we call an ulcer. Now all ulcers have some characters in common, and it is to these that I would particularly draw your attention. I will first, however, discuss what appears to me to be a much less important subject,—namely, the points in which they differ. Some have smooth and even surfaces; their surface is also red, and if examined carefully, even by the naked eye, seems to consist of a congeries of pointed processes (granulations), over which there is observed a very thin, semitransparent coating, of a soft, and, in appearance, semifluid, mucus-like secretion (lymph): if we look at the edge, we find it smooth and level, and surrounded by a very minute halo of vascularity. I mean that there is a fine line around the ulcer, of a brightish red colour. If we examine this ulcer once a-day, we find that it exhibits a secretion, answering in its character to healthy pus. There is a faintish, mawkish odour; but we do not recognize it as fœtid.

If the ulcer be healing, there is, in addition to these appearances, an opaque, delicately thin, and apparently levelled margin in its circumference, which is a fine film of new skin, or that which is to become so. These are the characters of what is called a healthy ulcer. All the circumstances which I have mentioned may exist, with the exception of that last adverted to. In other words,—the sore may be, in other respects, not demonstrably otherwise than healthy; and yet it will not heal. More commonly,

however, when an ulcer cannot be brought to heal, there is an obvious departure from the above characters. Such departures may exist simply, or may occur in every conceivable combination. The circumference may be irregular, oblong, jagged, or of any variety of shape; the edge may be thick or undermined; the surface may be white, yellow, smooth, or shreddy and ragged; the discharge may be thin, bloody, watery, or highly offensive, acrid, and stimulating to the surrounding skin. The sore may be unusually excavated, forming a circumscribed cavity; or it may be superficial in one place, and deep in another. There may be no granulations perceptible; or if there be, they may be round, obtuse, flabby, or purple; the surrounding redness may be more highly developed in extent, or darker in colour; the sore may also be extremely painful. Sometimes we observe granulations form in the centre of an ulcer; and, becoming covered by skin, form little islands as it were in the sore.

Now these various appearances, when met with in certain states of combination, have led to the application of certain names to ulcers which present them. When the sore is uneven on its surface, jagged at its edges; when it secretes a serous, sanguineous, or ichorous discharge; and when it is painful; we call it irritable: by which, practically, a disposition to increase is generally understood. If you stimulate it strongly, it is apt to slough or to increase by ulceration. Applications, unless of the most soothing kind (by which I mean those, the object of which is chiefly confined to the regulation of temperature), are apt to give pain, and the sore shews no disposition to heal. If the granulations are large, grey, flabby, and inactive, we say that the sore is indolent; because there is not the same marked departure from the actions of a healthy sore, and because such sores are sometimes found to progress favourably under applications which, we believe, act in virtue of their stimulating, strengthening, or exciting qualities.

For the most part, however, the various characters of ulceration which I have mentioned, are combined in such interminable variety, that we soon find any attempt at a nomenclature of them useless. Yet, in a few instances, on the contrary, ulceration seems to preserve a certain uniformity of character; which, inasmuch as the resemblance is maintained in different individuals, we conclude to depend on some peculiar or specific circumstances. Such is more or less the case in syphilis, cancer, and scrofula. Thus we speak of syphilitic, scrofulous, cancerous ulceration, and so

on: all of which, you perceive, must be more fully treated of in connection with the respective subjects. I wish you, then, to observe, that the surfaces of sores, inasmuch as they enlarge in breadth and depth, shew the existence of absorbents; and that they have blood-vessels, in that they diminish, fill up, and heal, and their surface is sometimes extremely vascular: that the pain, and various sensations by which they are attended, shew that they have nerves; and that, in fact, an ulcer has obviously all the characters of a living part.

In linking ulceration with that production of inflammation which we call suppuration, we observe no difference between them, except that suppuration is commonly a process which terminates more or less quickly in healing; whilst, in ulceration, the suppuration is continued, as also in the case of the fistula of which I have spoken, for an indefinite period, with the superaddition of a new structure, exhibiting phenomena which we agree to call ulceration. Now this is all I wish you to recollect for the present; because, like all other subjects, this must of course be treated more fully by itself; and what applies to it in connection with inflammation, I shall consider as we proceed.

MORTIFICATION.

I shall hereafter be obliged to speak again of mortification, in connection with other subjects; but it is necessary that I should, in *connection with inflammation*, at once give you a *general* notion of the subject. You must not imagine that mortification *simply* implies a loss of vitality; because, if you look at a limb in a dead body, and what we call mortification in the living, you will see no similarity. To this there is, indeed, one exception, presently to be mentioned: but what I intend, with regard to mortification in general, is, that it is a peculiar process,—a process, in fact, of life;—and for this reason, we never see it in anything but a living body. When inflammation is to terminate in mortification, we always find that the inflammation is very vehement in degree, and seldom healthy in character; that is, it is diffused*; there is no line of demarcation

* This is true, even in boil, carbuncle, &c.; which become, in relation to circumscribed and diffused inflammations, most interesting links as connecting the chain of diseased phenomena. For there is, in all of them, an attempt at

to it until mortification has begun: it is, in fact, allied in its character to erysipelas. When a portion of living structure mortifies, we observe, first, that the scarf-skin (and I speak of the skin because we have no opportunity of seeing what happens anywhere else) separates from the skin (blisters or vesicates), and the skin itself becomes, in various cases, yellowish, brownish,—in some cases, greenish, and ultimately, perhaps, dark, or even black, in colour. When it is finally thrown off, it is not in the least like the natural structure; whatever of organization there was in it seems somehow or other to have been destroyed: and I hold this to be a very curious thing. It is not the decomposition of putrefaction, that appears certain; so whether it may have wrought some change in itself, or whether any material of value to the system has been appropriated by the absorbents, and the curious appearance which we observe be consequent to its subtraction; or whatever may have been the cause; at all events, a distinct process has taken place, and one which, in regard to the power which exerts it, must be regarded as vital. All other things being alike, the probability of mortification is in proportion to the degree of inflammation; but then this is too general and vague a rule to be of much use in practice. The structure of the part, and the kind of inflammation, are the essential things to know; for these are the chief sources of our information, *as regards the part*, as to the probability of mortification taking place. Inflammations which are attended by violent actions of the system or part, with but little power, are very prone to terminate in this process; and the same may be said of inflammation attacking parts endowed with small vessels or few nerves, or both, as bone, ligament, fasciæ, fibrous and ligamentous structures, generally. In destructive inflammation of the eye, the cornea, the vessels of which are very minute, is generally the first part to slough. Sloughing, gangrene, sphacelus, and mortification, are all convertible terms: though I hardly know that any of us agree in their exact definition. When we see portions of dead substance thrown off from a surface, although active inflammation continues in the circumference, we generally say that the surface is sloughing. When a considerable portion loses at once its vital power, and takes on the appearance which I have before mentioned,

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localizing the inflammation; the success being greater or less in different cases, but scarcely complete in any, the redness generally extending more or less indefinitely around the more immediate seat of the disease.

we say it is gangrenous; and when the changes are carried so far, that the whole limb becomes dark or black, we usually employ the term sphacelus. There is one very curious kind of gangrene or sphacelus, in which the change really appears to consist in the simple abstraction of life, and in which a limb presents very little difference, if any, from one which may have lain some days in the dissecting room. All other exemplifications of mortification are attended by the production of some quantity of moisture; this is, therefore, sometimes called dry gangrene. It has been found, in connection with ossification of arteries, and other morbid conditions of the circulatory apparatus. Wherever mortification of any kind occurs, and the patient recovers, there are certain changes that take place, which are common to every variety. The parts subjacent to the line between the mortified and sound structures, are removed by absorption; and thus the part to be got rid of becomes isolated from its connections; always, however, having by this time undergone a very remarkable alteration in appearance and structure. Now, then, if we wish to prevent inflammation from terminating in mortification, we act on the suggestion naturally arising out of its phenomena. That is to say, that as we observe mortification seldom to occur without violent inflammation, the way to avoid it is to prevent the inflammation from being violent: and we characterize this endeavour differently, as regards the mode or its activity, in proportion as the vehemence actually present receives additional force, either from the kind of inflammation, or from the peculiarity of the structure in which it is seated, or the *causes on which* it may depend. This is all I need say just at present; except that, in any measure you may adopt to reduce inflammation threatening to terminate in mortification, you must recollect that mortification never occurs, except it is occasioned by direct injury, without implying a combination, which is always an element of difficulty in the treatment of every disease; that is, great excitement with disproportionate power. You will see hereafter that there is no single phenomenon in any one of the steps which Nature pursues in inflammation, which may not be rendered of great use in the treatment of diseases. It is with her a process through which a multitude of effects are produced, and one by which we may effect changes in a number of maladies; and which, if the causes which produced them be attended to at the same time, leads to their safe removal. Thus, if we wish to get rid of a new structure, we may often effect changes in it which either bring it within the pale of some of our

other modes of proceeding, or which of themselves remove it. The mode in which I successfully removed, as I believe, for the first time, a peculiar kind of *deep-seated* vascular tumour, sometimes called aneurism by anastomosis, or deep-seated nævus, was suggested by a consideration of what Nature does in various examples of inflammation. Superficial or subcutaneous nævi had been often removed in various other ways; but the first successful removal of this kind of disease, involving a peculiar depth and extent of connection, was effected in the cases to which I have alluded, and which you will find in the eighteenth volume of the Transactionss of the Royal Med. Chirugical Society.

Mortification, then, occurs as a sequence on violent inflammation; and it also occurs, in rare cases, without, so far as we can see, the previous occurrence of violent inflammation, as in the dry gangrene. Ordinarily, therefore, mortification requires some little time for its occurrence; but it is to be remembered, that it may be preceded by the ordinary inflammatory process, and yet may be carried on with such rapidity as to justify the phrase, "the part suddenly mortifies." I met with a case of this kind, which, all circumstances considered, was very extraordinary. A young man, aged thirty-four, by occupation a brewer's drayman, went to bed, perfectly well, as he said: this was about nine or ten o'clock. He awoke very early in the morning, about two or three o'clock, with a most violent pain in the finger, which already appeared very dark, and in one part black. I saw him at one o'clock the same day. Had any person seen the finger of this young man thus, not twelve hours after the first attack, he would have regarded the change as the work of at least several days. The first phalanx of the fore-finger was completely mortified, and thoroughly black; and the corresponding phalanx of the middle finger seemed rapidly approaching the same condition. I found, too, that his habits were very different from those of the generality of brewer's draymen, most of whom drink large and almost incredible quantities of beer; but this young man said he could not do it; and this I afterwards had reason to know to be true. I never saw a nervous system in such a condition. Every fibre in his body seemed in a vibratory action. Pulse rapid and bounding; the patient complaining that he felt very ill, &c. He lost the first joint of his fore-finger; but ultimately got well. He is still alive; but his nervous system is exceedingly deranged. Since the attack of mortification, he has been very ill with a strange set of symptoms, threatening dropsy,

and attended by the ordinary features of severe salivation, exhaling even the odour peculiar to that condition, but without having taken any mercury. He rallied, however, from this state. I may state that his circulation is always in a much disordered condition; and that the organ most prominently out of order is always his liver. He is fat, and altogether what I suppose would be regarded amongst drayman as the beau ideal of the craft.

There is, likewise, a species of mortification in which ulceration and mortification are combined, and which is in the highest degree interesting, as shewing, in its varying indications, the alternations of success and failure in the powers of the animal œconomy.

In one description of these cases (for I can only speak of what I have seen), a patient is presented to you with an immense sore, occupying, perhaps, half the leg below the knee. It is deep, and presents, in many parts, a yellowish, sloughing surface; whilst, in others, it is merely that of ulceration; and is in some covered by florid, and even not unhealthy-looking, granulations. The discharge, however, is usually more or less thin and ichorous; and it exhales a most peculiar odour. The only character of this, that I can mention, is, that it is highly offensive, with the superaddition of a property which seems allied to acidity; and, if you examine it closely, and for some seconds, so as to breathe air much impregnated with it, that it seems slightly to embarrass respiration. At least this is the case with me, who, for many years at least, could breathe almost anything. I may observe, that you seldom or never get this kind of sore to heal, although it often flatters you by an appearance of so doing; and, indeed, it may actually heal to a considerable extent. It generally occurs in old people, but is, in appearance, altogether different from that mortification which takes place in the toes and feet of such persons; nor does it occur in persons whose powers are so exhausted. For, although, as I have said, the cases seldom heal entirely, yet I have known persons a year or two, or even more, with such sores; though they seldom, I think, go on longer than that,—gradually sinking without there being any remarkable difference in the sore.

Another variety of mortification, though perhaps differing very little in its essential causes from the foregoing, takes place in a small district. A sloughy spot appears, the slough separates, and the part begins to heal; but, as it heals, another portion of skin begins to slough, and so on; the patient in the end sinking. Mr. Abernethy used to tell a very interesting case of this kind. The most remark-

able one that I recollect of it occurred in a very fine man, who had been confined a very long time by an accident, the consequence of which was, that he lost his exercise without making corresponding changes in his mode of living, in anything like the requisite proportion. Just as he was getting about, a small spot of slough occurred in his foot, which he attributed to an uneasy shoe. It was very small, and presented nothing very different from what I have stated. In colour it was yellowish, and slowly separated in the usual manner. Before the sore healed, however, his powers suddenly sank, and he died. I mention these cases at once (though I cannot go fully into the subject), for two reasons; first, as impressing the different varieties of mortification to which they refer; and, secondly, as inculcating a caution in regard to prognosis; for really we see these cases, with such local manifestations of reparative power, co-existing with a countenance exhibiting so little indication of approaching failure, that, without caution suggested by experience, we might well be excused for expecting, and therefore for representing to the friends of the patient, happier results than our best-directed endeavours in such cases usually enable us to obtain. I may observe that, in some examples of mortification, it is very common to find that the blood is coagulated in the large vessels, beyond the mortified part, constituting evidence of interrupted or embarrassed circulation, on a certain freedom and vigour of which the preservation of the life of parts essentially depends; and this is all I think it necessary to observe at present on the subject.

THICKENING.

I have hitherto considered those processes of inflammation which we call resolution, adhesion, suppuration, and mortification, because they are the sequences which are usually first mentioned as those of inflammation. There are, however, some others, concerning which it is necessary that we should consider a few circumstances, before we treat of the causes of inflammation, whether immediate or remote; and one of these is thickening.

If we regard the result of the thickening process, and that of the adhesive, we can perceive little similarity between them; yet they are, in truth, not so different as their results would lead us to imagine. There is more or less coagulating lymph effused when parts become united: this becomes vascular, and assumes the cha-

racters of the parts which it unites. Now, thickening is little more than an increased degree of this. We have no reason for believing that the matter first effused is other than coagulable lymph; and we know that, as regards its becoming vascular, and assuming in general the characters (and, in many cases, identically so) of the part, the result is the same. Thus, if a bone, ligament, tendon, fascia, or membrane, become thickened, we discern no difference *necessarily* from the ordinary characters of the part, except that which the thickening itself constitutes, or which may be reasonably referred to it. The part may be less elastic, or it may be less transparent; but this may happen equally with a piece of any elastic material, such as Indian rubber, for example. Increase of bulk is, of course, implied in the term thickening; and inconveniences, in the execution of function, occur from this circumstance. It is further important that you should be impressed with the fact, that this thickening usually results not from *violent*, but from *enduring*, excitement; and, as the vessels of a part are seldom excited without doing something, it is interesting to observe, that the products of this sort of inflammation are generally deposited under such a modifying action of the part, that they gradually assume the structure of it; in other words, the product is deposited in a form least injurious to the function of the part which it occupies.

To estimate this, we have only to imagine that it were otherwise; that the matter of bone were deposited in muscle; and *vice versâ*. Indeed, we sometimes see a practical exemplification of this departure from the more salutary mode of proceeding; and the result is always a much greater deterioration, and frequently a complete abrogation, of the function of the part in which such deposition occurs. This leads me to remark on such exceptions to the more ordinary effects of chronic inflammation. Of these, we may first speak of such examples as may be referred to a kind of misplacement of products natural to the œconomy, as when bone is deposited in ligament, fasciæ, tendon, or in the arteries or membranes, and, I might add, other parts; for, although these parts, amongst those which are not naturally of an osseous character, are the most frequent seats of osseous deposition, yet bone *may* be deposited anywhere. So, on the other hand, ligamentous structures may be deposited in bone; and it is also interesting to remark, that, where ligament best supplies the place of bone, there we find it most frequently thus deposited. Thus, where bones have to support weight—a function for which ligament is obviously altogether

unadapted—we very rarely find it deposited, ununited fractures being almost the only examples of such deposition; whilst, where a bone is merely a point on which some power pulls, it is an every-day occurrence, as we see in fractures of the point of the elbow (olecranon), and the knee-pan (patella).

But this, however, is but a hint on a very important subject. An exception is apparently suggested in the common results of fractures of the neck of the femur within the capsular ligament—a subject which will be fully considered in its proper place; and a capital example of the numerous departures from legitimate modes of induction, which have contributed so much to retard the progress of science. The true reasons of ligamentous depositions will then, I trust, be made apparent: but I must now proceed with the general subject.

The results of *increased action* in a part sometimes present still greater aberrations than any of those yet mentioned, in that the products which they deposit are altogether strange, and like nothing else that we see in the animal œconomy; but in this they are little different from common pus or matter, which is alike a new product. Thus, various structures, of every conceivable diversity of physical character, are occasionally deposited; so that they considerably alter the form of parts, and destroy the symmetry of the body by the unsightly projections which they constitute. This happens in regard to tumours, as we call them, which do not always form in a very slow manner, though this be their general character. Why I refer them to chronic inflammation will be more spoken of as we proceed; but I may here mention, that there is not more difference in the excited action demonstrable in some examples of tumour, than there is between some kinds of chronic inflammation, which we acknowledge to be such, and other more marked examples of active inflammatory action. Besides, we have no idea of any new product taking place, without an increased action of the vessels of the part; and, as it will be seen that this is the essential thing in all inflammations, regarded as the proximate condition necessary—although in neither the one case nor the other are we to regard it as the cause—as I shall in due time explain.

I must beg the reader to recollect that my object is not confined to writing a treatise on inflammation; and that, therefore, until I can apply the whole of its phenomena in the consideration of disease, I must rest satisfied with the statement of elementary facts and principles, as far as it is necessary to give the ground-work of

the subject; and so far as it may be necessary to enable you to understand me when I proceed, as I presently shall do, to consider the law to which its multiform phenomena refer. The facts, then, which I wish to impress in regard to what we term chronic inflammation, are, that the term, in its necessary and conventional acceptation, merely refers to certain unnatural actions going on in a part, and attended by some new product; and that the employment of the term arises, not unnaturally, from the following considerations. We begin by regarding inflammation as the co-existence of heat, redness, pain, swelling, &c. and as usually leading to certain processes, called adhesion, suppuration, ulceration, mortification, &c.; but as we trace it through its various degrees, and as affecting various structures, we find it to link with a variety of actions, modifying, very materially, the disposition with which we commenced, until at last, as in some abscesses, the production of pus or matter is the only character remaining of those which we originally attached to it. Pursuing the chain, which I am supposing to have been thus traced, and which I shall trace for you more particularly as we proceed, we find that depositions of various kinds take place, which again have nothing in common with the inflammation with which we commenced, except the deposition of new matter; which is, in fact, a convertible term with "new action." No deposition can take place without action in the vessels; and thus, inasmuch as these new depositions retain one, and that the most essential, character of inflammation, so we retain the word inflammation, adding the epithet chronic, as marking its comparatively slower progress; and (by a conventional extension) the absence or feeble development of its leading characteristics, as pain, redness, &c.: but we can by no means mark the line which divides the formation of pus, the result of slow and chronic forms of increased action, from the production of this matter, by the milder forms of inflammation, in its more common acceptation. Neither can we mark any line (as regards the degree or the kind of excitement) which divides those cases in which pus is produced with the smallest quantity of perceptible excitement, from those cases in which depositions of various kinds of tumours take place. We alike infer the action in both cases from its products. Then again, in some tumours, we have much more visible evidence of excitement than we have in many cases where pus, an acknowledged product of inflammation, is nevertheless secreted very largely, as in certain forms of chronic abscess.

It will be advantageous now to take a retrospect of the phenomena we have collected, to which I will then add such others as may appear necessary, in order that you may be able to proceed with me. We have seen then—

1. That inflammation, in its usual definition, implies co-existence of heat, redness, pain, swelling, and throbbing; and that it is in fact often, but not invariably, accompanied by these phenomena.

2. That when parts are separated by local injury, and are again placed in contact, re-union of them frequently follows, and that this process takes place by the effusion of coagulating lymph from the divided surfaces.

3. That the contact of inflamed surfaces produces adhesion in parts where no wound had been inflicted.

4. That, in other cases, the union takes place after the previous secretion of matter or pus; by the subsequent deposition of new parts, called granulations; and that in an ulcer, which is to heal, the granulations become gradually covered, from circumference to centre, with a fine pellicle, which ultimately assumes the nature of skin.

5. That when the wound unites, a contraction takes place, so that the scar is much less than the wound, of which it marks the situation.

6. That, in some cases, the inflammation extends widely from the part, involving considerable and extensive destruction of surface; the constitution becomes disturbed; but still the original wound, and the parts destroyed in consequence of the inflammation, ultimately heal, though slowly, and through a tedious and painful process.

7. That in other cases, again, the parts destroyed do not heal, nor the wound which preceded the inflammation; but that, the constitutional disturbance continuing, the patient sinks, in a condition not distinguishable from typhus fever.

8. That the products of inflammation, which we regard as terminating in suppuration, are various; one of these being pus or matter, to the more common, and, as we believe, more healthy species of which we attach certain distinctive peculiarities.

9. That the occurrence of any of the terminations of inflammation, as we conventionally designate them, may take place in any of the structures of the body; but that, *cæteris paribus*, these

these terminations seem to be influenced in their character by the structure of the part affected.

10. That, as regards inflammation occurring in the skin, cellular tissue, or at the surface of the body, the terminations seem to be chiefly influenced by the degree of the inflammation; except that we remark in the skin (no matter why, at present) a tendency to suppuration, though not perhaps so strongly marked as in mucous membranes.

11. That the whole of the mucous membranes of the body, (parts in continuation with the skin), manifest a very *obvious* tendency to suppuration when inflamed.

12. That, on the contrary, serous membranes manifest a great tendency to adhesion.

13. That, in regard to certain *consequences* following the infliction of a wound (apart from the healing of the wound), whether this have been confined to the surface of the body, or whether it involve a cavity like the abdomen, and whatever may have been their relation to the wound inflicted; they all take place in the same structures, on other occasions, independently of any previous local injury.

14. That a continued suppuration sometimes follows, and coexists with inflammation, which alters the structure of the part, and which we call ulceration; that the secretion, however, may be the pus we first described, or any of its varieties.

15. That another form, in which suppuration is continued, is by the production of a fistula or pipe, which is lined by a secreting surface, and one possessing the general characters of a mucous membrane.

16. That one effect of inflammation, not essentially different, perhaps, from adhesion, is the thickening of parts affected by it. That, most commonly, this thickening partakes, more or less, of the natural character of the part, and sometimes is identical in structure with it.

17. That, in the departures from this rule, the matter deposited is nevertheless *generally* similar to some other known structure; as when bone is deposited instead of ligament; in the ossification of arteries; or when ligament is deposited in place of bone.

18. That, however, the newly deposited matter may be altogether new, and not only unlike the part on which it is deposited, but unlike any other structure in the body.

19. That various tumours are exemplifications of this, espe-

cially those which are deposited *in*, as contradistinguished from those which are deposited *on*, a part.

20. That chronic inflammation implies slow progress of action, the result of which is a product not different from some of those resulting from ordinary inflammation; but that the term is extended to cases in which little remains of the character of inflammation, but that which is most essential, viz. increased action.

21. That mortification is a sequence of inflammation, or a kind of inflammation in which certain parts entirely lose their natural characters, become wholly disorganized, and isolated from the surrounding structures.

22. That, with one exception, we can hardly presume that this is simple death of parts, in its ordinary sense, because the dead body does not present us with corresponding phenomena: that it is, in fact, a peculiar change, whatever its nature may be.

23. That there is no part of the body but which may become inflamed.

24. To these, I may add, that as different parts have been seen to be more or less prone to this or that termination of inflammation, so it is equally true that inflammation, as a whole, is much more frequently seen in some structures than others. For the moment, one example of this will be sufficient; namely, the skin, wherein inflammation more frequently occurs, in some form or other, than in any other part, or than in all other parts put together.

Before I begin to make use of our phenomena, I must say something in regard to what has been called the proximate cause of inflammation. This is a subject which I should have been glad to have avoided, as one most unprofitable; but, in the first place, I should have offended the prejudices of many people, had I passed it over; and, in the second, it is a subject on which many erroneous notions prevail, from which the mind must be disabused, before it can pursue the subject of the real causes of inflammation with advantage.

DISCOURSE VII.

ON THE CIRCUMSTANCES ON WHICH THE OBVIOUS CHARACTERS OF INFLAMMATION, AS HEAT, REDNESS, ETC. DEPEND, COMMONLY CALLED THE PROXIMATE CAUSE OF INFLAMMATION.

In considering, further, the actual condition of a visible part affected by ordinary inflammation, I should, were I to follow my own inclination, restrict myself entirely to those circumstances which are obviously deducible from its physical character; because, as regards any information derivable from the part, I consider that the inspection by the unassisted eye conveys to us just as much information of which any practical use can be made, as all or any of the experiments which have been made on living animals, either with assistance of the microscope or otherwise: but I can scarcely hope that my readers will be so wholly freed from preconceived notions on this subject, as to be satisfied with such a mode of treating it; nor could I even assist (however humbly) to the removal of erroneous and unprofitable modes of investigation, without testing the real value of their results by other and more tangible modes than passing them altogether unnoticed.

Boerhaave thought that in inflammation there was a state of blood in which that fluid became altered in quality, and moved slowly through the vessels; and that the red globules became impelled into vessels in which they were not naturally designed to move. Cullen thought that inflammation resulted from a shutting up by spasm of the minute vessels of a part, and that inflammation consisted of an endeavour to overcome this spasm by an increasing momentum of the circulation of the part. Vacca had a theory of inflammation, which referred it chiefly to a relaxed state of the vessels.

All these theories suppose that there is obstruction to the circulation: now, supposing this to be admitted, and any of the various explanations allowed, we are really not at all advanced in our actual knowledge on the subject;—but of that presently. Mr. Hunter went differently to work; but still not, as it appears to me,

in the best manner; yet, certainly, as regarded the ascertainment of the actual condition of the part, his mode was, perhaps, more promising. But the real knowledge of the subject is not to be obtained by such modes of investigation. The knowledge required being, as I shall shew, not what produces the appearances in the part, but the process as a whole. However, Mr. Hunter proved several important facts by experiment:—first, he satisfactorily shewed that the arteries which distribute the blood had a power of acting on their contents, independently of any force exerted on them by the heart; and, further, that this power of acting on their contents was of two kinds,—the one in virtue of an elasticity, and the other by means of a vital contraction, similar to that possessed by muscular structures; and this by a kind of evidence which, though, when rigidly considered, is scarcely so conclusive as some others derivable from natural phenomena, was still one to which the minds of men are usually more accessible; whilst it confirmed, or at least supported, conclusions drawn from those last-mentioned sources. In regard to Mr. Hunter, I allude chiefly here to his experiment of bleeding the horse to death, and then measuring the arteries, as already described.

In explaining some of the most remarkable phenomena of the blood in the living body, it is essential to remember that the arteries possess this power; for, as the heart impels the blood into all the arteries of the body, it is impossible that it can favour any particular set of vessels; so that, unless the vessels possessed a power of acting on their contents, it would be impossible to understand how it happens that one part becomes more loaded than another, or how it becomes nearly or quite deprived of blood: both of which occurrences are exceedingly familiar; and as one example of the former is presented in inflammation, so Mr. Hunter's experiments had a direct connection with this process. To prove that the vessels of the inflamed part were enlarged, Mr. Hunter induced inflammation in a rabbit's ear, and afterwards killed the rabbit, and injected the arteries of both ears. He found that the vessels in the inflamed ear were larger than in the ear in which no inflammation had been induced. Then Mr. Hunter made experiments to ascertain the increase of heat in inflamed parts. He induced inflammation by acrid applications in differents parts of animals, taking (both before and after the production of inflammation) the heat by the thermometer. The result was, *generally*, that inflammation increased the temperature of the part, but scarcely

above that at the sources of the circulation,—viz. the chest of the animal. But Mr. Hunter thought (and very naturally perhaps) that when inflammation took place near the sources of circulation, then the heat there also might become raised above the natural standard. Now no man can be less inclined to undervalue anything which Mr. Hunter has done, than myself; yet a desire for a true and simple mode of study obliges me to remark, that the facts developed by these investigations,—and I allude especially to the increased quantity of blood in an inflamed part, and the increased size of its vessels,—are surely matters not more fully proved by Mr. Hunter's experiments, than they are by observation of inflammation as it occurs without its production by experiment. As one example of a thousand that might be cited, do we not notice, in an inflamed eye, for example, the vessels enlarge, as I have already observed; many carrying red blood, which before carried fluids, to us invisible?

A vast number of experiments have also been made with a view to determine the particular condition of the part inflamed; and it would seem that the blood is accelerated in the large vessels, and that it moves more slowly in the small ones.

Perhaps, as it would occupy your time very inexpediently to give anything like a digest of what has been done on this subject, I may tell you a few of the principal circumstances; and I cannot do this better than by referring to a paper in the 4th volume of the Repertoire d'Anatomie, by M. Kaltenbrünner; because phenomena, which he asserts that he has seen, really appear very likely to occur in inflammation; and his statement, as being the best and most probable account of what really happens in an inflamed part, will enable me, in a way most favourable for this kind of investigation, to contrast it with that which I hold to be the philosophical mode in which this important matter should be studied, and which, you will find, is not by concentrating our attention on the inflamed part.

M. Kaltenbrünner says, that, after an injury to a part, there is a period, of longer or shorter duration, during which no phenomena are observable: and this he calls the period of incubation. Then inflammation begins:—1st, there is a determination or flow (afflux) of blood to the part; the circulation, also, is accelerated in the neighbourhood of the injury; and that this extends to a circumference, greater or less, as the case may be: after a time, the circulation in some of the vessels begins to be slow; and at length the

blood in particular parts stagnates, forming "stases," as he calls them. The process is now seen to be again stationary: after this, he says the congestion diminishes from the circumference to the centre; and that the inflammation terminates by what he calls a true crisis, this being an exudation of a sanguineous fluid, "fluide sanguinolente." He says that the points where the blood becomes stationary, form in the following manner:—at first the blood begins to move slowly in some of the capillary (minute) vessels; and that then its movements become uncertain, and as it were vibratory, "le sang semble occiller irregulierement dans ces endroits;" and then, in different points, the blood stops altogether. That these "stases" form near the focus or centre of the inflammation, become most numerous as the inflammation is more violent; that they form more quickly in some parts of the body than in others; as in the spleen, liver, mucous membrane of the bowels, more quickly than they do in the lungs or mesentery; and that the minute veins, and not the arteries, seem the situation of their commencement, &c. Moreover, he says that they do not occupy the whole of the vessels, but that a void is left around them.

He says, that, before these stagnations take place, the globules of the blood pass enlarged from the arteries to the veins; that some of these globules are evidently first decomposed by a separation of the serum; and that then several of them unite and become stationary, forming the "stasis" of which he speaks. This may be seen, he says, in the mesentery of a rabbit very distinctly. He adds that, in congestion, there are no stases; so that these seem to be one circumstance essential to inflammation. In suppuration, he says that the first thing that happens is the detachment of little flakes from the stagnations or "stases" which I have mentioned; that several of these unite to form conglomerate clots (grumeaux agglomerées); these again uniting, form bodies of indefinite shape; that now canals are formed round them in the surrounding parenchyma, which is thus gradually removed; the canals, increasing, tend towards the surface, where they pour out their contents; that, in sphacelus and gangrene, the conglomerate clots are not formed, but the flakes increase and move about irregularly, and ultimately destroy the parenchyma; that, in gangrene, no motion of these flakes is observable.

He says that the real termination of inflammation is by a secretion that exudes through the vessels, and that then the pus diminishes; still the secretion that so exudes is very easily organ-

ized; and that he has seen a net-work of vesssels form in it in the mesentery of a rat. The effects of inflammation often remain; but this is the termination of the process. Farther, the various phenomena of inflammation described disappear in the inverse order of their occurrence, the last disappearing first, and so on. Of the effects or traces of inflammation, he says that the vessels often remain too large for their contents; that the fluid exuded is often absorbed; and that this is expedited by friction, stimuli, &c.; but care must be taken in adjusting these, or inflammation may be reproduced.

Some remarks, not uninteresting, follow in the relations which inflammation has to fever, &c.; but the chief points are those I have mentioned as relating to the actual nature of what occurs in the part; but you will see how very few of the occurrences are really of importance when we subtract from them that which a careful observance of the obvious phenomena supplies; and, for the sake of disencumbering the argument, I will, for the moment, admit, that, notwithstanding most of the experiments appear to have been made on animals whose laws of life are so different from those of the human subject—as frogs, or animals writhing under suffering—I say I will admit, for the moment, that there are no objections to the conclusions so obtained; that phenomena thus observed may be really those which occur in the inflammation we have to treat in the living body.

Now the really essential facts for us to know—I mean as regards the seat of inflammation—may be stated as follows:

That inflammation disturbs or suspends the function of the part attacked; that an essential condition is, that more blood is sent to that part; that, in proportion to its vehemence, it will, *cæteris paribus*, produce thickening, effusion, suppuration, adhesion, sphacelus, or mortification; that it has a great tendency to spread in some parts more than others, especially in serous membranes; that, as it absorbs or suspends functions, so is it most dangerous, as the organ performs a duty most indispensable to the animal œconomy; that, as an essential feature of inflammation is a determination of blood to the part, and activity of its vessels, so the main object, as regards the part, is to diminish the action of the one and the quantity of the other*. But I would ask, which of these facts can we

* The reader must not infer that I mean by bleeding.—See Treatment.

not safely deduce from the contemplation of the most common, every-day, too frequent, and too unequivocal phenomena?

The truth is, that these facts emphatically establish that kind of treatment which we have *hitherto been taught* to regard as best for inflammation; and neither M. Kaltenbrünner's facts, nor indeed Mr. Hunter's, do more: but that these are usually regarded as the essential facts, in respect to the treatment, is demonstrable; because the *present* best-recognized treatment of inflammation is founded on them; and the mere enumeration of the different points of that treatment will be sufficient to demonstrate the fact.

We bleed, we stop the supplies of food, we endeavour to induce action of the various secretions, we give rest and remedies which experience has shewn to have a direct tendency to abate the action of the heart and arteries. Our remedies, to be sure, are not strictly confined to these measures, as I shall presently observe; but they are those on which we are taught to place most reliance.

It may be true, that this is the best treatment at present in use; but that it is not the best treatment absolutely—that it is often unsuccessful, and where successful often injurious, and that therefore there must be some better treatment, notwithstanding whatever our ignorance of it may be—I hope to render sufficiently manifest. I would, however, observe, that the demonstration of one mode of treatment being imperfect, must not be held as necessarily involving the discovery of improved principles of practice (though I hope to shew this also); but still it is very important, as directing our attention to other more promising paths of enquiry, inasmuch as, amongst *many* that are wrong, we at least, in perceiving any of these, increase the chance of hitting on the *one* which is right.

Now, if the question were, why or how an inflamed part became red, how it became swollen, how it increased in bulk, why it throbbed, or why painful? the probability is, that the remarks already made have led us to a sufficiently satisfactory explanation of the phenomena; for, though the phenomena appear different, yet they are after all but a very common and almost universal consequence of increased action of the vessels, this condition necessarily implying more blood than usual. Pain is an increase of sensation, which, *quoad* the nerves, is as much increased action as violent throbbing is increased action of the arteries.

Pain is a very natural consequence of obvious departure from the natural condition of a part. If bodily comfort result, as it undoubtedly does, from a certain harmony between the nerves and the impressions to which they are necessarily and ordinarily subjected, it follows that any departure from this must be productive of the absence of such comfort; and, accordingly, we either find that a negative condition, chiefly characterized by the absence of our usual comfort, is the result of small deviations from natural sensation; or that, if this distance be increased, we either experience pain on the one hand, or absence of all feeling on the other; but we do not regard the beauty of this arrangement in the foregoing simple view of the facts: a very admirable result comes out of it, and highly calculated for the preservation of the body. When a disease occurs in a part, we should, *a priori*, be prepared to expect that parts usually most highly sensitive were attended by the greatest suffering; but this is far from being the case. Neither would the use of pain be so apparent, either as a suggestion or a caution, or admonition, in structures already endowed with so vigilant a sensibility. We find the arrangement, however, made, or what appears to be more useful and apparently more intelligible laws; for the result of pain being a state proportionate to the distance from the ordinary condition of parts, it happens that structures, ordinarily least sensitive, become the most so under disease. We see striking examples of this in bones, the whole apparatus of joints, ligaments, tendons, fasciæ, and serous membranes. Hence the admonitions which pain conveys are in the highest degree salutary. We may judge of this by what would happen were it otherwise. Supposing that we were constituted the same as at present: when serous membranes were affected, disease would make rapid and dangerous progress before we were scarcely aware of its occurrence; and, as tendinous parts, fasciæ, and bony structures, are exceedingly apt to perish under excitement, we should have mortification as the ordinary, nay unavoidable, result of inflammation, and destruction of life or motion, but generally of both, when joints become the subject of disease.

Thus, in these parts, the early, nay almost immediate, occurrence of severe pain obliges us to adopt measures which, whether singly or in combination with other modes of treatment, are most eminently calculated to restrict the excitement to the living powers of the part. If joints, for example, are affected, *repose*—of all

others the essential remedy—is emphatically the remedy of Nature; and in serous membranes the same thing is observable.

If the abdomen be inflamed, you have no occasion to tell a man to avoid exciting the alimentary canal, which it also invests, or to breathe gently, that the opposing surfaces may be as little moved as possible: nor have you any occasion for prescribing similar conditions in the chest. In both, the breathing is as short as possible, because the contrary is painful; and loss of appetite and pertinacious rejection of all food secures the alimentary canal from becoming the source of additional excitement.

We may further impress the use of pain from instances in which it does not occur. Now there are diseases in which we see this, as scrofula; and the very insidious nature of this disease—a material element in its destructive character—arises from the very general absence of suffering. From this cause many cases are allowed to make a very untoward progress before the proper means for their relief are adopted. The gums are an interesting example of a structure which is highly vascular without being sensitive, and of the diseased increase which may occur in such parts without exciting attention; but they are parts the affections of which are of far less consequence to the œconomy.

To return, however, to the other characteristics: the explanation of all these occurrences, the ratio symptomatum, as it has been called (and which, as regards the actual state of vessels of the part, whether the larger arteries or their capillary terminations, has occupied the chief labour, if it have not engrossed the whole attention, of most enquirers), is, after all, not the real desideratum.

What we really want to know is, why the phenomena occur at all, why the whole process is set up; not why or how this or that feature of it may be explained. This is the real desideratum; and that the whole defect of our treatment results from this, is very demonstrable; as it will also, I trust, be evident that the information is not to be found in the part. But, if we are not to confine our view to the part on one hand, there is no reason why we should altogether disregard it on the other: the right thing is, to include it in our consideration, and adjust its value, not to reject it altogether; for Nature never gives us any demonstration which may not be turned to some useful purpose.

In considering this subject, the very first thing that occurs to us

is, that by far the greater number of the more *dangerous sorts* of inflammation occur in parts altogether out of view; so that even were the local phenomena, in visible inflammation, of that consequence that many attribute to them, they would be of very little use in practice.

Inflammation of the brain, the viscera, the membranes which invest them, often also of veins and fasciæ, occurs without any evidence of the local character so much talked of as forming the essence of inflammation. But still it does not follow that diseases of the surface should not be consulted advantageously as types of Nature's mode of proceeding, in cases where the part cannot be seen. On the contrary, it is in this way that the study of surgery proves so useful, and, in my opinion, so essential, to the physician: but then it is quite obvious that we should study local manifestations with due care and attention, and, above all things, endeavour to separate those circumstances which are essential from those which are accidental or adventitious.

Now, as far as I know, this has not been done in inflammation, nor indeed much in other local diseases. We consider inflammamation, nay we define it to be the coexisting occurrence of heat, redness, pain, throbbing, &c. in the part; and yet, if viewed properly, it is quite clear that all these are adventitious phenomena: they are very intelligible superinductions on inflammatory processes; but not one of them can be regarded as essential. We therefore see at once how little possible it is that such a mode of viewing the matter should ever lead us beyond our present treatment.

Redness often takes place in every part of the body without inflammation; and inflammation may occur, and always commences, in *some* parts without redness, as in the cornea of the eye, and iris; yet we can certainly quote no inflammation more insidious or more destructive of function than these.

If such views of so common a process be entertained, no wonder that surgeons thus taught require separate instructions with regard to this particular organ. Heat and redness of parts are also exceedingly common without any inflammation. Blushing and reaction after cold are examples of both: whilst we have no opportunity of knowing the temperature in the most important inflammations which we have to treat.

It is certain that many *inflammations*, even near the surface of the body, dubious in their progress, but not distinguishable from inflammation as to their results, afford little evidence of increase of

temperature. Throbbing is also by no means an essential symptom of inflammation. In the first place, in many slow inflammations it is wholly absent; but, what is also to the purpose, throbbing especially, to a violent degree, takes place in the head, for example, without any inflammation. In short, to a certain amount of local excitement of the arteries, throbbing is doubtless essential; but local excitement of the arteries, though essential perhaps to inflammation, yet inflammation is not essential to it; for the simple reason, that throbbing often takes place without it.

But, when we consider swelling, we have more difficulty in separating this from inflammatory processes; for we very rarely, if ever, see inflammation without increase of bulk, and scarcely ever increase of bulk without accompanying processes, which, although they may not readily range themselves under our ordinary notions of inflammation, it will be found, as we proceed, impossible to disconnect from that process; since the essential characters, the results, the laws of animal œconony, to which they refer, will be found to be similar, if not identical in both cases. We know of no inflammation without some secretion; we know, nor can we conceive any secretion without an increased action in vessels of some sort or other, and, therefore, inasmuch as we cannot separate the phenomena of inflammation from increased action of vessels of some sort or other, we at length narrow the local question into this, to what order of vessels are we to refer this increased action? and the answer to this appears to me to be, primarily the arteries, and subsequently the whole vascular tissue; more blood is sent to the part, more is returned; both arteries and veins are larger, more is secreted.

On the same evidence, we see that the equilibrium of secretion and absorption is disturbed; and that, whatever the absolute amount of absorption may be, we see that there is more deposited than taken away; otherwise no increase of bulk, of course, could take place. But, we now come to the really important question—why does inflammation occur at all? and this is as difficult, perhaps, as important; but, let us see then whether the simple circumspection, on all the phenomena, which are so bountifully showered on us, and so intrusively invite our observation, will not do something to solve this difficult, because as I believe neglected, problem.

The few foregoing remarks afford you little idea of the vast quantity of labour which has been uselessly expended, in en-

deavouring to unfold the proximate cause of inflammation, that is, what is the particular or precise state of the vessels of the part; but we see the unprofitable nature of the conclusions to which this labour has led, in that the only useful facts are those which may be really obtained with scarcely more labour than common attention to obvious phenomena.

It is, for example, evident, in most *visible* inflammations, that there is increased heat, bulk, with redness and pain; and whether we adopt this or that explanation which has been offered of the immediate cause of these phenomena, or reject them all, it is clear that we found our present treatment on that which, in visible inflammations, is the most obvious and constant, and of which the explanation is most glaring and conclusive. I mean redness, which is one evidence of an unusual quantity of blood in a part, of increased activity in its vessels, or of both; but you have seen that redness is itself an adventitious circumstance consequent on the colour of the blood, as is also the evidence *thus afforded* of the activity of the vessels.

That the leading feature in the present mode of treatment is deduced from this evidence of more blood in the part is plain, from bleeding being of such general adoption; for, however modified the abstraction of blood in various cases, still the essence of the treatment is a subduction of vascular action by depletion, and this equally where bleeding forms part of the treatment as where it is omitted. The consideration of purging, sweating, counter-irritation, or depressing remedies, ultimately resolves them into means calculated to diminish the vascular action in the part. The treatment, in fact, entirely consists in ministering to the symptoms; it does not, so far as I see, embrace any enquiry even into the causes whence it may really have arisen. If the case be mild in degree, or in a part which is unimportant, the treatment is directed to the part to diminish the quantity of blood circulating there; but if the inflammation be violent, or the part important, why then we diminish the actions of the whole system, to diminish the actions in the part; as if, not being able to guide the system aright, we had no other means left but stopping its actions altogether, so far at least as was consistent with the preservation of vitality.

Now, were the treatment thus briefly adverted to uniformly successful, or could we even satisfactorily explain the reasons of its frequent failure, we might excuse our ignorance of this subject, and regard our knowledge, small though it be, as having already reached that limit allowed to our finite capacities. But no man of reflec-

tion can seriously entertain this idea for a moment. A very few facts, intrusively thrust on our notice, as it were, show not only the puny condition of our knowledge, but that the way is open for its growth and improvement. We see, in fact, that, however it may happen, our present treatment may remove inflammation; yet it is quite evident that the treatment and the cure do not stand in the relation of cause and effect. For example, many of those cases which terminate unfavourably, are those in which we have had the fullest opportunity of carrying out the whole of our treatment in its most powerful and energetic manner. I have seen a patient die of inflammation, where the direct depletion was carried to such an extent, that some thought that the patient died of the depletion; yet, when the peritonæum was examined, it was found to be highly inflamed, and regarded, and probably with justice, as the cause of death.

I have also seen an eye perish by suppuration consequent on what would be called a pure inflammation, notwithstanding the adoption of the most vigorous anti-inflammatory treatment. The inflammation, commencing in the conjunctiva, rapidly extended to the globe, and, as I have said, the eye was destroyed by suppuration. I grant that, when not accompanied by morbid complications, which we have already learnt to recognize, such occurrences are rare; but that renders them the more valuable when they do occur; and it thence becomes the more important that we should not neglect the lesson they teach; for no natural phenomena, of any kind, are ever less than the exemplification of important laws: our ignorance is the only bar to the discovery; and this arises, in ninety-nine cases out of a hundred, for want of observation, in the philosophical sense of the word; they must be seen by the mind's eye as well as the body's.

But if inflammation does occasionally prove fatal in spite of the most severe lowering and depletory treatment,—and if this be, as it undoubtedly may be, regarded as an exception to the ordinary result of such cases,—still it is by no means the only circumstance which occurs in the history of inflammation which seems to throw a doubt over the *depleting* plan being the real remedy for the disease. For the converse of what I have just stated is also observed: I mean that, occasionally, inflammations, apparently pure as we call them, do well without the abstraction of blood, or indeed without any means which can be reasonably explained on the principle of depletion; and cases occur wherein, although bleed-

ing has been largely employed and the cases do well, still the history renders it extremely doubtful whether the bleeding were the cause of the recovery. The cases to which I allude are unfrequent, it is true; but they are sufficiently common to be familiar: they consist, first, of cases wherein patients have refused to be bled; secondly, cases where depletion has been entirely neglected, or but sparingly practised, on account of some contra-indication, as debility; thirdly, of cases where bleeding has been carried both locally and generally to as great an extent as the medical attendant has dared to employ it, without materially influencing the symptoms, and yet the case may have recovered. Many years ago I was much struck by the following facts, which I remarked with the view of making them the subject of reflection, when the attention to the various details of an arduous profession should give me breathing time for the purpose. I knew a gentleman in very extensive practice; his peculiar opportunities, both public and private, led him to see a larger number of patients than, perhaps, any other man in London; moreover, he was a steady, skilful, and what is more to our present purpose, a very successful operator.

It is interesting to remark too that he performed a great number of operations for hernia; and so successful was he, that, out of about sixty-five operations for strangulated hernia, it is reported, he hardly lost two patients. He was a man who thought very much for himself too on all subjects, and was in many points very peculiar in his notions; and what, knowing the general truth of the foregoing remarks from the best authority, impressed me strongly as a curious fact, was, that he hardly ever bled at all in inflammation; nor was this fact the less interesting to me, from knowing that he was very active in his other measures, particularly purgatives and blisters. I am far from inferring, from these facts, that we should avoid blood-letting in the present state of our knowledge; I wish particularly to guard myself from conveying such an impression, which will be further explained when I treat expressly of that remedy; but the facts, whilst they throw a very strong doubt over our present practice being otherwise than exceedingly imperfect, teach us to look farther a-field, as I would say, in a manner which I shall explain as I proceed. Another class of facts, which must be borne in mind, are those which show that neither heat, pain, redness, nor even *perceptible* swelling, are essential characters of inflammation; because in inflammation either of them may be absent; and, on the contrary, either of them may be present without inflammation; just

as intolerance of light is an usual symptom of inflammation of the eye: yet inflammation may exist without intolerance of light, or intolerance of light may exist without inflammation,—a very common circumstance in strumous children.

It appears to me, that, if ever we are to progress in our knowledge of inflammation, and consequently in improving our treatment of it,—if ever we are to be able to refer it to laws, of which it must doubtless be the exemplification,—we must enquire into its real, and that this will be by understanding what is now technically regarded as its remote, cause. Instead of enquiring, in fact, what is the condition of the vessels, or any other structure of the *part* inflamed, we must grapple with the question why inflammation occurs at all? and I cannot help thinking, that, however various the apparent or exciting causes of inflammation may be, or however multiplied its appearances, its complications, or its effects, they are all referrible to one law in the animal œconomy.

There is nothing unphilosophical in this supposition, or contrary to the general experience afforded by the contemplation of the laws of nature; since any law with which we are already acquainted,—such as gravitation, or those regulating the motion or pressure of fluids or aeriform bodies, for example,—range under their dominion phenomena, to say the least of them, just as varied, quite as numerous, quite as much out of the reach of guess or anticipation, as would the phenomena of inflammation be, even were their number greatly multiplied.

I fear that the medical reader will think that I have dismissed the subject of the proximate cause of inflammation in too summary a manner. The truth is, I regard the enquiry as one on which more valuable time has been wasted than on any other subject whatever; and we have business in hand which is more important. I will therefore refer the reader to a sentiment of Lord Bacon's, quoted in the First Discourse*, and proceed to consider the real causes of inflammatory action.

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* Page 26.

DISCOURSE VIII.

ON THE REAL CAUSES OF INFLAMMATION.

In approaching this difficult subject, it seems prudent to adopt that plan which is found in other departments of knowledge where advances have been more considerable than those of medical science. Now, wherever a law of extensive influence is discovered, an attempt is usually made to discover what other phenomena, in addition to those already so disposed of, can be referred to its operation. In this way the enquiry is often proceeded in very advantageously, by asking questions of Nature, as it were, under the suggestions of that law. For, as progressing science seems to be constantly tending to diminish the number of laws, in relation to the number of phenomena, by ranging an increasing variety of the latter under laws already discovered; so we are always led to infer, *a priori*, when we find a certain law in operation, that it comprehends more phenomena than our present knowledge enables us to ascribe to it. Now, if we look at the œconomy of the human body, there seems, in relation to its preservative processes, or to its diseases (which, properly understood, are really nothing but attempts at such preservation), to be nothing so like a law, or more tenably establishable as such, than the tendency of certain actions, which we call diseases, to the surface of the body. But in examining any law by means of its phenomena, our perception is very materially influenced by the order in which we examine them.

They form a continuous chain in all cases; but the connexion can be traced only by examining the links in the order of their proximity. If we do this, the connexion is palpable and easy; but if we jump from one link to another remote from it, the continued type, plan, or principle, may be just as true, but so modified as to escape detection. This is well known to comparative anatomists; but I beg you to think of it as vastly important in connexion with the study of diseases.

If we examine the manner in which injurious agents are got rid of in health, we find that they are brought to the surface; in

other words, they are ejected from the body. Many organs seem to have this as their chief, if not their only function; such as the kidney, the large intestines, and perhaps the skin: and, again, other organs, whose primary or chief function may be of another kind, seem, nevertheless, to contribute in part to the ejection of injurious influences, as the lungs and liver. We draw these conclusions from those facts which shew that, if any of these functions become suspended, the œconomy at large becomes exceedingly disturbed; and from observing that even any irregularity or embarrassment in these functions, either also disturbs the œconomy, or requires an extra, and indeed a compensating, exertion from some other organ. Besides this, we know that many substances are thrown off, which would be positively injurious; such as carbon from the lungs and skin, and the peculiar matter which constitutes the urine.

That the action of the bowels cannot be suspended or embarrassed with impunity, unless some compensating influence be substituted, is too well known to require any amplification. We also know, that when all these organs become simultaneously embarrassed, the system becomes peculiarly excited; that there is then disturbed respiration; paucity of secretion from bowels, skin, and kidney, and frequently liver also; with excitement of the heart and arteries; which constitute, in fact, what is called fever. We know, further, that a very common relief from this state, is a determination of secretion to some one of these organs; and, perhaps, none is more frequent or more effectual, than to that which forms the surface of the body. But of this we feel certain, that this determination must be evinced by some one of them; because a patient with fever was never perhaps known to recover without it.

In order to be clear, this determination may not, it is true, be evinced by an increase of any of these ordinary secretions, or by any superaddition to them; but then we have what we call inflammation, and then the most safe is that which occurs on the surface: the recognition of this fact is popularly expressed, by saying, that the fever has fallen into such or such a part. And if, in such cases, we begin to bleed and use debilitating influences, we often risk the life of the patient, of which I have seen a most marked example; but of this hereafter. It is true, also, that, in the absence of this, we may have inflammation of some internal part, which is highly dangerous, and the reason of which I shall endeavour to explain in its due place.

We accustom ourselves to make certain differences in regard

to subjects which are matters of sense, which we can see, handle, and touch; and those to which we can apply neither of these modes of recognition; and some of these differences, as giving that precision to language which is necessary for the communication of the several characters attached to such matters, are of course necessary. Such are those differences which refer them to their obvious qualities,—as colour, form, hardness, softness, &c. When, however, we extend our notions to the laws which *regulate* the phenomena exhibited in visible and tangible matters, and conceive that they must be essentially different from those which regulate invisible or intangible forces, we do two things, equally unsafe and gratuitous. Gratuitous, because we have no facts on which we can legitimately ground such distinctions; and unsafe, because the assumption supposes powers of distinction in our external senses, which they do not evidently confer on us. I must beg you to consider this, in all endeavours to interpret the phenomena of Nature.

When we set about collecting phenomena or facts in regard to the living body, and especially when we have collected a vast number (for, however poor medical knowledge may be, regarded as a science, it is fortunately rich in facts) and proceed to throw them into some kind of arrangement, with a view to ascertain their natural relations and dependencies, we are struck by the large number which obviously possess one character in common; and this regards the situation in which they occur, or in which they ultimately terminate,—this being the surface of the body. Knowing that everything in Nature is regulated by some law or other, we know that these facts must be so regulated; and, from their occurrence in the same machine, or the same being, we naturally infer that the law which regulates them is, in all probability, one and the same. We must first, then, collect the facts; and, having ascertained any one property they have in common, we must extend our enquiry with a view to ascertain if they have any other properties in common; because the accumulation of such *common* properties will afford us only the true help in ascertaining, either the law under which they occur in common, or the proximate agent in the administration, as I may term it, of the law.

In teaching, and especially in conducting the enquiry I am now about to unfold, we must suppose nothing; we must first collect facts. I have already mentioned how certain things, no matter of what kind, whether tangible or intangible, are thrown off from

the body by the lungs, liver, skin, kidney, and so on; the reasons, whence it is evident that something injurious is thus thrown off, consisting in the manifest disturbances which follow its retention, and being further illustrated by the mere glance which we have just given, for the present, at the phenomena of fever.

We will now, then, proceed. We find that, under various circumstances, foreign bodies, as bullets, stones, pins, needles, thorns, &c. are made to enter the body; that sometimes, as a direct consequence of the force with which they impinge on the body, as bullets, and sometimes from other causes, they travel very curious routes; these leading them to considerable, and even indefinite distances from the part at which they entered the machine. But we find, whatever the course of such foreign bodies may be, that they ultimately are brought (with very few exceptions) to the surface of the body. Pins and needles have been even swallowed, and yet have been safely conducted to the surface, and there expelled. I recollect a patient who sat down on a needle, which entered the part, and was for a time lost sight of: at length, a little spot of inflammation was set up on the outside of the knee of the same side, and this ending in a tiny abscess, the needle was discharged. Such examples are familiar to surgeons. Mr. Hunter mentions them, and states the mode of their progress, in saying that the route is made for the foreign body by the absorption of parts. He adds the term progressive, but perhaps that is not necessary; the statement of the simple fact is sufficient.

It is true, that this ejection at the surface does not happen absolutely without exception. Foreign bodies are sometimes retained in the body, of which gun-shot wounds present occasional examples: yet it would seem that even then they are in a manner isolated from the body. I recollect once examining a body with Mr. Stanley, in which we found a bullet on the inside of the sternum (breast bone); it was adherent there, but it was wrapped up in a neat little capsule or bag, which Nature had formed around it,—a fact which I shall make use of by and by, in regard to, *apparently*, a very different matter.

Another fact, mentioned by Mr. Hunter, which I wish you to consider, is the progress of an abscess. Matter forms, we will say, on the abdomen, deep away from the skin, and very close to the abdominal cavity. A thin membrane may only intervene between the abdomen and the matter; whilst muscles, fasciæ, cellular tissue, and skin, constituting a great thickness of parts, are interposed be-

tween the matter and the surface. Notwithstanding, the matter comes to the surface, a road is made by absorption, either through or between these various structures, and the skin becoming thin, and absorbed at a certain point, the matter is discharged at the surface. Now this is very curious, and it is equally true, if I had supposed the abscess to have taken place in any other district of the body; and we shall find it to happen in a hundred, or even in a thousand instances, before we find one example of the contrary. We can perceive no reason of a mechanical, nor from the isolated fact of any other kind, why the matter should not have made its way towards the abdomen; since, in regard to apparent mechanical obstructions, there were much less on that, than on the side next to the surface of the body. So, when an abscess forms actually within the cavity of the abdomen, or chest, the same thing is generally true; nor is the bursting of an abscess, elsewhere situated, into the alimentary canal, or into any of the ramifications of the respiratory tubes (both of which occasionally happen), to be hastily set down as an exception; since this also involves, in fact, the expulsion of certain matters from the body. So, if an aneurism forms, we find that it makes its way to the surface,—bones, or all other structures, whatever their nature, becoming gradually absorbed; and, in the same degree, the aneurism approaching the surface, until at length, if nothing be done to remove the cause of the aneurism, or cut off the supply of blood to it, the skin itself, which forms its last covering, becomes removed. In a case wherein I tied the femoral artery for an aneurism of the ham, about three years before, an aneurism formed in the aorta, which, coming into contact with a portion of the alimentary canal, burst into it; the patient dying, not at once, but by repeated hæmorrhage.

If we continue our observation of the surface of the body, we perceive a vast number of other phenomena of a similar character. You know that the efflorescence of scarlatina, the eruption of measles, or pustules of small-pox, all occur on the skin; and you also know that these complaints alone furnish thousands on thousands of examples of actions taking place, of some kind or other,—of what kind we shall examine presently. Still, even these form but a very few sources of the phenomena observable in this situation. The various diseases of the skin furnish a multitude of other examples. In Dr. Bateman's Synopsis of Diseases of the Skin, alone, in which an arrangement is made of them from certain resemblances in their obvious appearances, there are mentioned

about 130 different forms of disease; and yet this includes, certainly, but a comparatively small number of those diversified forms which are seen in Nature. So that, in fact, we soon find that the catalogue of external actions, when we multiply their obvious varieties in appearance, by the number of persons affected in all countries, by one or other of them, is so great as to exceed all powers of calculation.

But still, we have not done with examples; for a great number is yet to be added from sources not included in the mention of those already referred to. We have gout, erysipelas, boils, carbuncles, common inflammation, and a multitude of diseases of the eye; all of which are common complaints, all of which affect a large number of people, and all of which occur at or near the surface of the body.

All this is very remarkable; and the first thing presented in the enquiry thus made, is, that we have observed an infinite number of phenomena, which have this one thing in common,—that they have all a certain seat, or a tendency thereto, this being the surface of the body.

At this stage of the enquiry also, we gradually arrive at the perception of another relation which they have in common; and this is, that the tendency of such actions is, in the main, beneficial to the animal œconomy. In some, it is demonstrable; in others, a matter only perceptible through some previous reasoning; in a third class, an inference of high probability; but, in all, the general beneficial tendency is clear and intelligible. In the case of the foreign body, we see the œconomy displaying so much of a beneficial tendency, that it discharges what at least we can be quite certain is of no use to it,—as a bullet, pins, needles, and so on. In measles, scarlatina, and small-pox, we infer benefit, because the eruption relieves the disturbance which preceded it; and we observe, also, that the eruption is usually in harmony, as to its degree, with the constitutional disturbance which it relieves,—that is, if the previous disturbance be great, so is the eruption, and vice versâ. The repercussion, as it is called, or the sudden disappearance of all diseases of the surface, is a circumstance highly dangerous to the animal œconomy. This has been often exemplified in various instances; in most of what we call cutaneous diseases proper, and also in gout and many other disorders. One more example, which I mention on account of its incontestible frequency, is seen in the history of those multiform processes which

take place on the surface,—the variety of sore legs, ulcers of the extremities. Injurious consequences are well known frequently to follow the healing of such ulcers; and it is equally certain, that these consequences are most common when the ulcers appear to heal exclusively in consequence of local applications; and, on the contrary, that when their healing is accompanied by, or accomplished through, means of improvement of the general health, it is safe. The connection between ulceration of the extremities, and general disorder, is still more strongly impressed, if that be possible, by those cases in which they are seen to occur in alternation; such as oppression of the chest when the leg is well, and free respiration when it is ulcerated, of which I have seen a multitude of examples; nor can we connect that disturbance of the whole œconomy, which is known to follow the sudden disappearance of disorder on the surface, with any particular form of disease. We know it as an occurrence; more familiar, it is true, in some forms of disease than in others; and especially in those which are more glaringly marked by previous disturbance, or at least by the presence of injurious influences,—as gout, for example; but still we can select no form of disease of the surface in which experience shall enable us to say, that its sudden disappearance may not be followed by some other disturbance of the general œconomy. More of such illustrations must be given as we proceed; so, for the moment, let these suffice.

On comparing now the retrospect with the prospect, we not only perceive that diseased actions, which occur on the surface, are very numerous, but that they are more numerous than those which take place in any other part, and, in fact, than in all other parts put together. This is, indeed, a striking result, and one which impels us, with a renewed vigour, to further enquiry; but let that enquiry be, first, the further collection of phenomena. Let us increase our facts.

Having examined the skin, then, we follow its continuations, and we find them lining the canals of the body, the respiratory digestive and urinary organs, and forming what I have already told you are the mucous membranes. All these parts are continuous, you will recollect, with the external surface, exactly as the inside of a glass is continuous with its outside; moreover, some of them are primarily employed (as the stomach and lungs) for the reception of matters from without; in other instances, wholly in their excretion, as the liver, lower bowels, and urinary organs; the lungs discharging both offices.

In leaving the actual surface, we have declined investigating local injuries, as not being either necessary or strictly applicable to the argument. Now in the throat we meet with daily occurrences of diseased action of some sort or other; common colds and sore throats are familiar examples; we find also, if we continue our search into the windpipe and its ramifications, that here again we meet with a crowd of disordered actions, of which daily instances are presented to us, so that we cannot walk the streets without meeting them. I mean irritation of the lining membrane of these tubes, and secretions of various kinds which take place from it.

So in regard to the actions of the mucous surface of the alimentary canal. This has been already mentioned as always active. Of what we call disease, too, we observe continued and daily examples. Sickness, purging, various augmentations, as well as innumerable examples, of disorder of secretion, demonstrate how almost infinite are the disordered actions which go on in this structure. Then, at both its extremities, we have various affections of the mucous surface; not that all those which we observe in this situation are instances in point (which I mention to avoid conveying an impression which is not true). You know that diarrhœa, dysentery, cholera, all appear to be seated in the mucous membrane of the bowels, or to be disordering influences *determined thereto* as their ultimate destination.

Then, if we examine into the apparatus by which the urinary secretion is discharged, and which also is in continuation with the surface of the body, we see actions so often occurring there, that, although the consequences to which they lead, from neglect or what not, often involve every other structure, yet they commence, almost without exception, in the mucous membrane. Now, when we have collected this, which I may call a second series of phenomena, and when we compare them with those collected from the surface, we observe some results highly interesting. We perceive two things which they have in common: first, that the actions in each terminate by ejecting something from the body; and, secondly, that, although the processes vary in many of their features, they still involve, in many and in most instances, the common phenomena of inflammation, and in all, its essential character; that is, increased or altered action, and increased or altered products: usually both. It is absolutely necessary that we should, in examining the phenomena of inflammation, extend the idea to increased action; and this, because in tracing that or any other

phenomenon, we must, as Lord Bacon says, "extend our investigation to things in common." Now, in all inflammations, however different, we have one thing in common (increased action); and, although increased action may not necessarily imply what *we term* inflammation, yet it is, as I have said, not only the most universal attribute of inflammation, but it is its most essential feature. Perhaps congestion may be the proximate link to it; secretion, simultaneously with, or independently of, demonstrable congestion, the next. At all events, increased secretion is increased action; and inflammation, though it may be *different in kind*, is essentially nothing else.

There is one other surface which, although external, is not like the skin exactly, but is a mucous membrane; and that is the conjunctiva, which lines the eyelids, and is reflected on the front of the globe of the eye. We know that this organ is affected by a vast number of diseases; so that, by practising on the ignorance and credulity of the public, it has been represented to them as affording a separate family of diseases, as it were; as if something peculiar existed in regard to them, or as if they were under different laws: and I would by no means assert, that oculists may not, in many cases, be their own dupes, in a scientific sense, and actually believe that it is so. However, I only mention all this to impress, first, that diseases of the eye are very numerous, as regards those appearances on which our nomenclature is founded; and secondly, that, when we enquire where they occur, we find that, taking the whole mass of patients affected with all known disorders of the eye, the proportion of those on the surface to those in any other part of the organ is greater beyond all calculation. Common ophthalmia, catarrhal ophthalmia, scrofulous ophthalmia, purulent ophthalmia, in its various forms of degree and variety, erysipelatous ophthalmia, of which you see many examples in debilitated constitutions, all occur on the surface; and, to give you some idea of how large, and in fact incalculable, proportion of diseases of the eye are seated in this membrane on the surface, I may observe, that, in regard to only one variety, namely, the scrofulous ophthalmia, Beer says, that about ninety cases out of every hundred are cases of this form of the disease*.

In connection with this form of ophthalmia, I beg you to ob-

* Nor does the fact that climate is implicated in producing scrofula explain this circumstance. See this subject resumed further.

serve two things: first, that, although we cannot say that it may not often be excited, or otherwise influenced, by local circumstances, yet there is no ophthalmia, nor any other form of disease in the eye, that we can more constantly connect with derangement of the general health, nor any which is so nearly exclusively confined to the surface of the organ. All other inflammations, if not watched, may and do destroy the eye by the inflammation extending to other structures; whereas, when strumous inflammation injures the organ *(and this it seldom does now, unless entirely neglected or negligently treated)*, it is almost invariably by a speck of opacity on its surface. Beyond this, it is very rare indeed to see strumous ophthalmia do any harm; and when a speck occurs, it has always been, in my experience, consequent on an ulcer which existed before the patient was brought for treatment. I lately met with a case which interested me in respect to this subject, and which is worth relating. A little boy was brought to me with an affection of the eye, which, from the aspect and age of the child, and the intolerance of light, without much appearance of inflammation, seemed a light form of strumous ophthalmia; but, on looking into the eye, I perceived that the inflammation, though slight, was of a pinky colour, and evidently seated in the sclerotica. There was a small spot of ulceration on the cornea, with a minute vesicle on its point; and, on examining it with a magnifier, I perceived a black spot on the vesicle. On enquiring whether the eye had met with any injury, the mother assured me that it had not; which statement the boy confirmed. I then asked whether he had any pains in his limbs, or whether he had caught cold; which enquiries were answered in the negative. I now enquired into the nature of the boy's employment, and was told that he assisted in filing brass and iron. I then had little doubt that a portion of iron had flown into the eye and penetrated the cornea. I took a piece of fine linen, and passed it lightly over the ulcer; and thus brought away a small particle of black substance—another portion, however, yet remaining. As the vesicle induced me to think that the cornea had been penetrated, and that nothing but the membrane which lines the anterior chamber remained entire, and as the boy seemed somewhat relieved, I used no further measures to extract the remaining portion. The inflammation rapidly subsided, and the boy did very well. Had I been less scrupulous in my examination, I might possibly have regarded this as a case of strumous ophthalmia, primarily affecting the sclerotica; since, curiously enough, the

boy had a large, prominent eye, thick lips, and altogether the aspect of a strumous disposition.

Now these remarks in regard to the tendency we observe in scrofulous ophthalmia to confine itself to the surface of the organ, under varying degrees of inflammatory excitement, do not apply, it is true, with the same force to those other numerous varieties of ophthalmic inflammation which I have mentioned; but, as regards the seat which they primarily occupy, it is as true in respect to them as it is of the strumous species. Thus our enquiry hitherto seems to supply us with a still greater number of disturbances, which, if not all actually on the surface, yet are either so placed, or else on a part—mucous membranes, for example—which, in a practical sense, presents us with results analogous and (as regards the ultimate ejection of certain matters from the body) identical.

In continuing our enquiry still further, we however find other phenomena, other actions of the system, which seem, at first sight, to be exceptions to the general character presented in those we had already collected; for we observe actions of disease, inflammatory actions in fact, occurring in various other situations; so that, at last, we arrive at the fact that there is no structure in the body, nor any combination of structures, which may not be affected by inflammatory action. Now, if we had a growing conviction that the remarkable tendency to the surface, which we had observed in such myriads of instances, had any relation to any law which determined the actions in question, we should be led to regard inflammation occupying other seats in the light of an exception; for the heart, brain, lungs, and liver, are unquestionably, in some cases, the seat of inflammation; and, as such, they appear, *primâ facie*, as "contrary instances" to that general tendency to the surface which we had hitherto observed as so striking. Now it is the essential part of an inductive philosophy, that these or any other exceptions to any law which we may propose to establish, be explained or accounted for; otherwise we can by no means establish such law. If we can explain the exceptions, then they are no longer such; but more emphatically establish the law of which they appeared as aberrations If we can account for them by reference to certain interferences, and we can conduct this account to a high degree of probability, then the law may, though not demonstrable, be still rendered highly *probable;* but, if we can do neither—that is, neither account for nor explain the exceptions they form as apparent and not real—nor shew with probable cor-

rectness the influences which interfere with their exhibition of the laws, we must suppose that they have no relation to it.

Now the examination on which we are about to enter appears to me, instead of increasing any doubt which we are bound to entertain, to convert it rapidly into conviction.

To begin with the brain. Without refining unnecessarily, we will admit that the brain becomes occasionally inflamed. We find the products of inflammation of the brain in the ventricles; but then these are lined by a serous membrane, of which these cavities are, strictly speaking, on the outside. But cavities are found in the substance of the brain, undergoing various changes, as in certain cases of effusion of blood from apoplexy. The blood becomes absorbed, the cavity covered by a smooth surface, and ultimately filled by a fluid. The brain also occasionally undergoes positive change of structure, of a solid form, in the deposition of scrofulous and other tumours. General fulness of the cerebral vessels, which is an essential element in inflammation, likewise occurs; so that all these circumstances, whether regarded separately or in combination, leave no doubt but that the brain is subject to inflammation. But we now find an important fact of another kind; viz. that, for one case wherein this happens, perhaps a hundred, or perhaps a thousand, in fact an indefinite number, occur, in which the inflammation is either confined to the membranes of the brain, or has demonstrably commenced in these external investments of the organ. We find lymph, matter, serum, and the various products of inflammation, thickening of the arachnoid membrane or of the dura mater, and vascularity of the pia mater; but these all evidently are inflammation of the membranes. But of this tendency we again gather fresh evidence at every further step in the enquiry. If we examine the lungs, or rather the chest, for one inflammation of the substance of the lung, we meet with innumerable examples of its being confined to the membrane (the pleura) which encloses them. Thus, what I remarked with regard to that continuation of the skin which lines the ramifications of the windpipe is also true of the pleura. Indeed inflammatory affections of the pleura are so common, that we find the majority of bodies which we examine presenting traces of inflammation in this part, just as we find that there are very few persons who, under the form of slight colds or more serious affections, have not, at some period or other of their lives, been subject to inflammatory action of the *mucous* membrane of their respiratory passages.

Dr. P. M. Latham, who is an industrious observer of facts, remarks, in some lectures on affections of the heart, published in the Medical Gazette, that, in regard to the pericardium, the membrane which invests the heart, the inflammation of this membrane, as compared with its occurrence in the substance of the heart, occurs in a proportion so much more frequent as to be absolutely incalculable. Those who have examined many bodies must be struck with this fact, if it have not already occurred to them; and the general impression would be much stronger than it now is, if the fact were so well known as it is to Dr. Latham and others, who have had much experience in such examinations. The truth is, that we not only find this inflammation very common, but we find it where no symptoms during life had led to its detection or suspicion.

You know that the abdomen is lined, and all the viscera are covered (with exceptions not worth noticing), by a serous membrane; and here we find again the same kind of evidence; that is, that the external covering of the viscera is affected in an exceedingly large proportion of instances as compared to inflammations of their actual structure: so that here we see, in all the great cavities of the body, all the habitations of important organs, the same *tendency* to the surface. We know also, that, great as is the evil of inflammation of such surfaces, it is much less than when inflammation occurs in the actual substance of the respective organs. But inflammatory action is still less mischievous when it occurs on the mucous aspect of the respective organs, which are provided with such a structure, communicating with external parts; and, when it occurs on the actual surface of the body, it is less injurious than in any other situation. Before we proceed, then, in examining particularly any more facts, we will announce the law to which the phenomena already collected seem to point; and then we will test its application to the phenomena which we have next to consider; not forgetting, in the conclusion, those which seem to offer the greatest and most difficult exceptions to it.

1. The law, then, is, that inflammation is essentially a reparative process, and that, where the repair required is that of local injury, it is of course referred to the seat of such injury: in all other cases, it is a process instituted by Nature to get rid of injurious influences, by determining to the surface of the body.

2. In all laws, certain interferences happen which appear as exceptions, until such interferences are duly understood and explained;

when, of course, on removing objections or doubts in regard to the operation of such laws, they become either supporters of their probability or demonstrators of their truth, in affording an additional number of phenomena in subservience to them.

3. To carry out a natural law implies the condition of natural power, or a condition approaching thereto; and therefore the absence of natural power will be a competent explanation of the deviation from such law: if this absence be only probable, it will then be only a probable explanation of the deviation in question; if demonstrable, it will be a real explanation of it.

I would however, *in limine*, observe, that, though the expression of the law which I have used above may be substantial truth, yet it may possibly not express the actual law, but only something in approximation to it; since the various actions may belong to some law, of which they, and perhaps a multitude of phenomena which appear at first sight very different, may be the common emanation; but this is not, perhaps, important. If the facts be true, the step may be shorter; but the progress in science will not be less in fact, but in degree. In the inflammations about to be considered, it will be an essential element to shew that they are characterized by some previous or concurrent disorder of the general œconomy, disturbing natural power.

Begging you to recollect, then, what I said some pages since, as to the necessity of examining a chain of phenomena, link by link, in order to recognize the connection, I begin with a few remarks on gout.

You are probably aware that the usual history of gout informs us that it generally occurs about the middle or towards the decline of life; that it is most common in those who have the power of living easily, not to say always luxuriously; that, as happens in regard to most other diseases, we can, *cæteris paribus*, usually trace something of hereditary influence in the disposition to it; that its occurrence as an external disease is often very sudden. A man, perhaps, going to bed pretty well, or at all events without pain, is suddenly awakened by a tremendous pain in his toe. He continues restless; and, examining the part, he finds it red, swollen, very hot, and throbbing. The pain varies in all conceivable degree, from slight uneasiness to actual torture. Ordinarily, the pain is very considerable.

Now we believe the disease to depend on some disordered condition of the system; and this, notwithstanding that many patients

date its occurrence from an accidental injury: and all the world agree in this belief, although, generally, they differ as much in regard to diseases as on any subject whatever. The agreement in opinion may not extend to the particular kind of disorder, nor the kind of remedy most proper for it: you may readily conceive, however, that the facts must have been very numerous and striking to have achieved even that general coincidence of opinion which I have mentioned. In truth, these facts have rendered the conclusion to which I have referred irresistible. This will save us from any lengthened discussion; and I will only mention, in a cursory manner, some of the facts in question. Many cases, where people have not complained immediately before the attack, are found, nevertheless, to have been preceded by a very palpable state of indisposition; such as nausea, deficient appetite, listlessness, or inaptitude for exertion, irritability of temper, a curious, unsettled, fidgety condition of the system. All or any of these, and a great many other sensations, less describable, generally admonish a patient that he is not well. Some who have had repeated seizures will foretell an attack of the gout by their sensations, although they are quite unable to particularize or explain what their sensations are.

Then the occurrence of gout frequently relieves various preceding disorders of the system; and this fact was so familiar a long time since, that, even within my own recollection, it was no very uncommon thing to hear of a person going to this or that place, in the hope of getting the gout to carry out, as it was termed, some other disorder. Bath was a very common rendezvous for people of this description.

Occasionally, also, gout has been suddenly repelled from the surface, sometimes by the imprudent application of local remedies, at others by influences accidentally administered; such as catching cold: and, in such cases, patients have generally had some highly dangerous attack of some internal organ, more frequently, perhaps, the stomach or the brain than any other; and these attacks have very frequently proved fatal.

The subject of gout also knows perfectly well that the occurrence of the disease is materially influenced by diet; and this knowledge is so universal, that even those who do not arrive at the very obvious fact, that habitual moderation is the essential thing, still have learnt to appreciate the influence of particular substances; so that you hardly ever meet with a gouty person but you find that there is some substance or other from which, however incautious he

may be in other respects, he habitually abstains; or, if he does take it, it is with a very vigilant moderation; whilst, generally, persons subject to this disease have a considerable catalogue of things which experience has told them they can neither eat nor drink with impunity. The most common are butter, fat, pastry, fermented liquors, or particular beverages, as beer, port-wine, punch, and the like. But patients who can take them with impunity are generally obliged to observe moderation, or to be constantly taking medicine*.

Quacks have, at different times, given specifics for gout; and these, as is generally the case, however prejudicial, generally afford the philosophical enquirer some evidence of the nature of disease. So, where they do not prove fatal, as was too often the case with the Eau Medicinale, they occasionally quickly rid the person of the disease. But we always find that it is by the vigorous excitement of some one or more—occasionally several—of the secretions; copious discharges from the skin or kidney, stomach or bowels, and sometimes from all these sources; the simultaneous disappearance of gout shewing its connection with the particular condition of the system at large. Lastly, the evidence of this, the local manifestation of disease, which we call gout, being an indication of general disturbance, is seen in the effects which certain moral influences have both in its causation and removal. Nothing is more frequently observed, than that mental inquietude in those so disposed will produce a paroxysm of gout; and, on the other hand, cases are not wanting which shew that peculiar moral influences will occasionally drive away gout as quickly as they will produce it. It has been known that a violent fright, such as a fire occurring in the house, has enabled a gouty patient, who could not set one foot before the other, to effect his safety by a retreat, just as nimbly as those whose limbs were in their natural condition.

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* Sydenham says that gout most commonly seizes old men who, amongst other things, have allowed themselves "free banquets, wine, and spirituous liquors," who are of a "gross habit of body," &c. (page 341—Works), or who have hastened old age by intemperance, &c.—349.

Cullen, that "gout attacks men of large heads, full and corpulent bodies, seldom occurring in eunuchs; that, amongst its causes, are sedentary habits, full animal diet, large use of wine or other fermented liquors," &c. (pages 56 and 57, vol. ii); and that "a plethoric state, inducing debility, is most favourable to it."

Morgagni, that "the gout is a disorder of the rich, seldom one of the poor"—page 57.

Another cause, which has opened the eyes of mankind to the connection of this malady, and indeed of many others, with the general condition of the body, is the entire inefficiency of local remedies; that is, those which can alone be safely employed. Warmth, either moist or dry; occasionally leeches; and, where it can be borne, gentle frictions; compose, I believe, the whole catalogue: and no one uses these with any hope of doing more than relieve the disease, or of keeping it from "flying" to some more dangerous part. I believe, in fact, that any idea of remedying materially the disease by local means is abandoned: that neither the most ignorant quack nor the best-informed person ever think of attempting it. I have not thought it necessary to illustrate the several foregoing facts by cases; but any book will furnish them: they are so notorious, that any specific evidence is superfluous. It is, however, necessary that you should remember also, that although the disease is of an essentially inflammatory kind, yet general bleeding is still less practised than local bleeding. I do not mean to say that gouty patients are *never*, still less that they *should* never, be bled from the arm; but still, when they are, it is never done with a view of *curing* the gout, but as relieving a state of system characterized by unusual fulness, which is regarded as unfavourable. But, whether with this or with any other intention, bleeding in this kind of inflammation is seldom practised; and where it is, it is not only not regarded as an influential remedy, but it is employed with the greatest caution. The local characters of gout are not without their interest, nor indeed without their bearing on the general argument; but it is unnecessary in regard to a disease whose connection with disordered conditions of the system is so generally acknowledged.

The pain, &c. of gout, is referred to the joints; but the inflammation is almost entirely external to them: so that it is not until after frequent attacks, that we find even the external structures of the joints really injured. It is, in this respect, analogous to a vast number of other cases of disturbance in joints; the inflammation is established external to them, that is, nearer to, or on the surface, as will be again remarked on as we proceed.

The *nature* and *varieties* of the connection before mentioned ought to be explained; but this is proper for a book especially devoted to the subject, and one, so far as I know, still wanted. Now, then, to review the facts of gout. We have an inflammation occurring on the surface, obviously connected with a disordered state

of system, and which state it has a direct tendency to relieve; also in which those measures, usually considered most potential in common inflammation, are not only useless, but so injurious as to be usually out of the question.

The next inflammation which I propose to consider, that is,—so far as it unfolds to us, or throws any light on the real causes of inflammation,—is a disease more common in the young, as gout is more prevalent in adult or advancing life;—I mean scrofula. I shall hereafter have to speak at length of this disease; I have only here to consider it in its relation to inflammation. In the first place, the essential facts so notorious in gout, are equally acknowledged in regard to scrofula;—viz. that it is, wherever occurring, to be regarded as a disease of the body generally, of which those local actions characteristic of the malady are merely indications. The reasons which appear to have led mankind to this conviction, and, at all events, which prove the fact, may some of them be briefly stated. Scrofula chiefly attacks persons of distinguishable temperament. Its subjects are most commonly fine skinned, what would be usually called good complexions. This, like many other characteristics of scrofulous tendency, is not universal; but perhaps it is the most general. Individuals of fair complexion, light hair, &c. are said to be especially subject to this disease; but this is by no means so general: hundreds of persons with dark hair, &c. are affected by scrofula.

It is well known that children often exhibit a tendency to the same disease as their parents: this is exhibited in many diseases; but in none more remarkably or more constantly than in scrofula.

It must be borne in mind, however, that in no disease is any development of this tendency necessary: therefore, notwithstanding the general truth of it in regard to scrofula, yet there are many exceptions. Scrofula affects all parts of the body; no structure is *necessarily* exempt from, or at least uninfluenced by, it. It is also materially influenced in its development, its progress and termination, by any thing which tends to derange the general œconomy: of the various channels through which these influences act, none seem more frequent than the skin, lungs, and digestive organs. With regard to the skin and lungs, scrofula is most common in variable climates, as that of Great Britain generally; and it is interesting to observe, that change of climate will develop scrofula very actively, and fatally, in those in whom no scrofulous

tendency was before observable. Animals, man inclusive, when brought to England from tropical climates, become very subject to scrofula; scrofulous disease, and of the lungs especially, is to them the peculiar danger of our climate. Monkeys, lions, &c. are very apt to suffer from scrofula; of which the Zoological Gardens and other similar collections furnish frequent examples. Notwithstanding that these and many other similar facts very decidedly point to the influence of vicissitudes of temperature as producing this peculiar disease, yet they are, perhaps, not more frequently the cause than derangement of the digestive organs; and they may often, perhaps, owe their influence on the animal œconomy to the previously disturbed conditions which always attend disorder of those important functions, and which invariably diminish our power of resisting noxious influences.

We never find the digestive organs healthy in scrofula; at least, out of hundreds of cases, I cannot *recollect one* wherein there was not a very detectable disorder of some of the chylopoietic viscera; unless indeed at a time when the patient was under treatment, which was so far successful as maintaining an apparently quiet condition of these organs. I lately had a case of strumous ophthalmia in the Dispensary, which, on a hasty examination, might by some persons have been regarded as an exception to this statement. The patient, a child, appeared to be in good health; and, what is certainly not common, the tongue was not only perfectly clean, but in all respects perfectly healthy; in fact, the only indication of anything wrong, was that the bowels were costive: I therefore gave the child moderate doses of rhubarb, and, in a few days, the eye had recovered: yet I have no doubt, had I given calomel, or some additional medicine, and put a leech or two or a blister behind the ear, the recovery would have been attributed to these measures as much as to the simple circumstance of regulating the bowels.

Now, in animals brought from warm climates, notwithstanding that their habits, and, to a certain extent, their food, will be different, yet various circumstances render it reasonable to infer, that change of temperature or climate is the chief cause: but, on the other hand, scrofula occurs in animals where we must attribute it, on the contrary, chiefly to change of food and habits. Rats, cats, rabbits, especially, are subject to scrofula; but, without taking upon me to say that the contrary never happens, I believe it is almost always in a tame or domesticated state. Birds are also subject to scrofula,

pigeons particularly: but here again the same observation is applicable. Now all this points, not wholly, I admit, but chiefly, to the digestive organs. The *treatment* of scrofula still more strongly confirms the intimate connection of the disease with the general œconomy. But I have said enough for the moment; and now, then, let us apply it to scrofulous inflammation. Scrofulous inflammation, as every one knows, occurs most commonly near the surface of the body. For one case wherein the lungs or mesentery (notwithstanding the terrific frequency of the former) are primarily affected, a vast number occur in the joints, skin,—in fact, near the surfaces of the body; and here again we see a beautiful illustration (by what we are accustomed to regard as internal parts) of the continued agency of the two great excitants of scrofula,—viz. climate and food.

Those parts affected in frequency, next to those near the surface, being the lungs on one hand, and the mesenteric glands on the other,—the first portals, as it were, through which the newly converted food passes to reach the circulation,—it is curious also to observe, that, as the inflammation is instituted in parts where, practically, it proves least injurious, so it is in these examples that we find the greatest approximation, remote though it be, to what we regard as the character of healthy inflammation; in other words, those parts where the inflammation is least injurious affording most exhibition of power. Thus, if we have ophthalmia, or glandular swelling, it is here that we have heat, swelling, and redness,—phenomena most nearly simulating the characters of common inflammation. But if scrofula attacks joints, then we have so little exemplification of these features of common inflammation, that although, quoad the joint, the effect to determine the action to the surface is partially successful in the effusion which takes place around it; yet so far is this from being thrown to the surface in a healthy or preservative manner, that the skin is actually paler than usual, so as to cause these affections to be called "white swellings*;" whilst, in the lungs and mesentery, scarcely any type, even of that which constitutes the ordinary features of healthy inflammation, is observable.

Well, I say scrofulous inflammation occurs most frequently on the surface. A child has a swelling in the neck, a part usually

* Not that the scrofulous affections of the joints are *always* unattended by redness of the surface covering them.

most exposed, or some gland in some other part is affected, or there is the peculiar strumous ophthalmia, or perhaps some joint is affected; the two former being the usual manifestations. We recognize, in the treatment, all the circumstances which I have mentioned; yet the part is red or swollen, and has the general character of a modified inflammation; but we recognize the local effects, like those of gout, to be peculiar, and thus confirming our notion that the disease does not wholly consist of vascular disturbances; we never think of *curing* scrofula by bleeding. We may, in certain cases, abstract blood, as in gout, and with different intentions; but still, not to cure the disease. If we take blood in strumous ophthalmia,—which, by the way, is oftener necessary in practice than it ought to be,—we do it not to cure the inflammation. I have been accustomed to explain it thus:—you know that you may have all other symptoms of strumous ophthalmia for months without the organ being injured; but not so with the inflammation; because, if the eye becomes injured as an optical instrument, it is by the thickening of parts that should be transparent: it is the inflammation which does this; and therefore you may be obliged, in the absence of being able at once to correct the condition of the system, on which the disease depends, to moderate this particular symptom by the abstraction of a little blood from the part: but you are so far from curing the disease, that, if you are not careful, you exasperate it by the very bleeding which you intend to do good.

Here, then, is another disease in which inflammation is a leading feature; in which inflammation appears even to produce the material change in structure; and yet which is clearly an external evidence of general disturbance, and which you attempt to relieve by means directed to the general œconomy, and in which your are so far from bleeding, that, if you know what you are about, you carefully avoid it: so that, as regards the chain, the links of which I am endeavouring to shadow forth, it would, perhaps, have been better to have put scrofula first; in which, both as regards the character of the disease, and the benefit of anti-inflammatory remedies, it is less an instance of inflammatory, and more an example of general disease, determining to the surface, than even gout itself*.

* In both diseases, excitement is unquestionably prejudicial; and hence it is, that, with a view to give strength in scrofula, a diet is often allowed which is highly injurious: but, important as this subject is, I cannot enter further into it in this place.

We have certain inflammations of the following kind:—the patient feels a pimple, rather tender, it gradually becomes painful, the part is stiff and uneasy, and, if in a situation subject to pressure, this must be avoided. At length, the pain, swelling, and tenderness increase to a most tormenting degree, when, becoming almost intolerable, the swelling bursts, discharges a little matter tinged with blood, a little ragged cellular tissue, and all is over. Here, then, is a common boil*. If this boil occur with greater disturbance of the health,—if it progress more slowly,—if it form less of a swelling, but extend to a greater district,—if it feel hot, hard, and brawny,—and, if not bursting, a section be made of it,—and this expose the subjacent cellular tissues in a state of quaggy slough, discharging more or less of blood and matter,—why then we call it a carbuncle.

If again all these characters are increased, if the pain be excruciating, if the parts assume a fiery, yet livid, lead-like appearance, with the gorged veins shewing their purple ramifications, we say it is an anthrax; so that, what I wish you to understand is, that, although these diseases are very different in their various degrees of danger and severity, yet that they all belong to the same family, and have many things in common, and this both in their local character, and in their relations to the general œconomy.

Now we have the local character of inflammation in all these diseases highly developed; I mean we have great evidence of increased vascularity, redness, heat, pain, swelling, and throbbing; and yet we do not treat them by what we are in other cases taught to be the great principle in the treatment of inflammation; I mean by depletion, or by reducing the general powers of the system: on the contrary, boil only excepted, in which scarcely any treatment is necessary, we rather moderate than reduce excitement, and endeavour to support rather than depress the vital energies. We do this, because we perceive that the inflammation, though truly enough inflammation, is but the indication of a general disorder of

* The connection of boils with the general health is recognized very distinctly by the older surgeons who have written in regard to it. Thus, Wiseman remarks that "boil proceedeth from a gross, vicious blood, separated from the rest as unprofitable, and is cast forth by the strength of Nature into the external parts of the body."—Wiseman's Chirurgical Treatises, p. 42.

Heister says (System of Surgery, p. 195), "that the cause of boils is a too glutinous and inspissated state of the blood; and that, when they are numerous, they require 'internal purging medicines,' and such as attenuate, and purge, and cleanse the blood." He also says, that a strict regimen of diet should be used.

the system on which it depends; and the facts which point to this —I mean independently of the failure of such treatment—are the following. Boils are well known to be connected with a certain condition of the system: this is different in different cases: sometimes there is a fulness of system; sometimes indigestion; sometimes costive bowels; and sometimes the condition is not easily referrible to either of these, certain people being liable to be affected by them whenever they are otherwise indisposed. In many, any irritation on the skin will produce them; and hence they are commonly enough the sequelæ of blisters. Many persons are relieved by them, so that they express themselves as feeling better after their occurrence than they have felt some time previously: thus they are often popularly considered as purifying the blood, as the phrase is; all of which facts concur in establishing their connection with disordered conditions of the system. As these are well known, let us proceed to carbuncle. This is always a highly inflammatory disease, and one very demonstrably connected with disorder of the health, a very prominent feature of which (in my experience invariably) is a derangement of the chylopoietic viscera. It is a curious fact, that they generally occur on the posterior surface of the body, to which we observe some tendency in boil. But, in carbuncle, the tendency is very remarkable. They also happen, in the great majority of cases, in persons who have lived well, as they phrase it, or who have been easy or luxurious in their habits; and Mr. Hunter says, he never had but one patient with carbuncle in the hospital; and this was a man who had been a gentleman's butler,—a class of persons who understand and indulge in good eating and drinking to an extent which is well known. I have, however, seen carbuncle occasionally in people whose history did not furnish any satisfactory evidence of luxurious or full living. Carbuncles are certainly much more common, now, amongst the lower classes of life than the foregoing observation of Mr. Hunter might lead us to imagine. I have seen a great number of them in my time in dispensary practice; so that I cannot regard them as uncommon, or even unfrequent, occurrences. It is very probable that gross or full living may be that kind of intemperance which most frequently leads to their occurrence; but the essential thing seems to be *any* mode which disorders the animal œconomy, and yet leaves it a certain degree of power. The great interest which results from seeing many cases of this kind consists chiefly in the emphatic manner in which that connection between boil and car-

buncle, which is so universally recognized, becomes demonstrated, as that also which marks anthrax as a more dangerous member of the same family. The recognition of the constitutional connection of all these diseases, though dressed in the language of the humoral pathology, is constant in nearly all old writers on surgery. The worst case of carbuncle I ever saw was in a butcher; and it is the only case of that form of the disease to which the term anthrax has been applied, that I had reason to regard as a genuine specimen. The moment I saw the case, I recognized the description I had heard of it; and especially what I had heard Mr. Abernethy say in regard to it. I accordingly pronounced the case anthrax; but I was much gratified in being able to obtain the concurrent opinion of a gentleman who had seen a good deal of anthrax, in connection with the plague, and who agreed with me that it was a genuine case: this was Mr. Davis, of Hampstead: As the case is rare and instructive, I shall relate it, and in the present volume; but it will be more conveniently done in connection with the treatment of these diseases.

It should be observed, that, although we recognize boil, carbuncle, and anthrax, as different diseases, in consequence of the different degrees in which their symptoms are developed,—yet their general characters being the same, and the degree in which these are developed endless, it follows that these diseases will be shaded off into one another, so that many examples may be regarded as connecting links between these undoubted members of the same family. Thus, a very severe boil, or a very slight carbuncle, is not a distinguishable disease; and I have seen another variety in which the progress was that of carbuncle; but the termination neither that of boil nor carbuncle, but in fact more that of common abscess, the contents being well-formed, inodorous, but very thick pus. Artificial arrangements of diseases are mischievous; but natural relations, even though much less distinct than are those of boil, anthrax, and carbuncle, should be carefully regarded.

In all these diseases we remark that there is great excitement; and in general, in the severer forms, little power: even in common boil we are not without evidence of both these in less marked degree. A boil is always attended by the death of more or less of the cellular tissue; and that this is not *merely* consequent on the degree of excitement (which, if vehement, may cause sloughing under any circumstances) is shewn in that its occurrence is not regu-

lated, in the abstract, by the violence of the excitement: in other words, we see a bit of sloughy cellular tissue, just as regularly in small or trifling boils as we do in severe ones. But this evidence of want of strength is more marked in carbuncle, and was very remarkable in the case of anthrax which will be related. So that any thing like large abstraction of blood, or indeed very powerful depletion of any sort, is out of the question. On the contrary, whatever the particular case may oblige us to do, and the indications will be different in different cases, we are careful to support the strength of the patient. In carbuncle, the evidence both of excitement and weakness are, in the local character, very marked also. The evidences of increased vascular action are seen in the extent of the redness, in the pain, heat, and throbbing; while the weakness is seen in the extent of the mortification of the cellular tissue. The section of a carbuncle is usually made with a view of expediting its progress, exposing ill-formed pus, with considerable quantities of sloughing cellular tissue; nor are we to regard this sloughing as the direct consequence of the excitement, since the same *degree* of excitement may take place, whilst the effects produced are very different; as in a common phlegmonous abscess: it is rather (I mean the sloughing) to be regarded as the joint result of excitement, acting on parts whose vital powers are, from some cause or other, diminished*.

Now here we have another set of inflammatory actions, well marked, highly developed, in which we observe these processes set up on *the surface of the body*, and their relation to the general œconomy, differently manifested in different cases, it is true, but still so intimately connected with some disordered state of the system as to be very unequivocal. Nor does the treatment point less to this connection than the history; since, with the exception of free incisions to expedite the separation of the sloughs, and poultices to facilitate their ejection, it is wholly directed to the general system: but that I shall describe in detail. I only mention

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* I consider inflammation as an increased action, &c.; but, in inflammation which terminates in mortification, there is no increase of power; but, on the contrary, a diminution of it. This, when joined to an increased action, becomes a cause of mortification, by destroying the balance which ought to subsist between the powers and actions of every part. There are, besides, cases of mortification, preceded by inflammation, which do not arise wholly from that as a cause, but rather seem to have something in their nature. Of this kind are the carbuncle and the slough formed in the small-pox pustule.—J. Hunter, op. cit. p. 8.

it now as tending to shew the nature of this disease. These diseases also afford another example of inflammation, in which the abstraction of blood is not employed; in which, in fact, the cure is principally conducted by influences directed to the remote causes, and properly the real causes of the malady.

Thus far we have considered processes in which, notwithstanding that the local characters presented are those of inflammation, we either bleed very sparingly or do not bleed at all; or, on the contrary, adopt a plan as much calculated to keep the quantity of the blood at par as to diminish it. In tracing, however, the chain, as I may term it, of inflammatory actions, we now come to a disease of a different aspect, and one in which we, for the first time, observe something which is a more decided type of what is *ordinarily* regarded as the leading feature in the treatment of inflammation; that is, bleeding or some other mode of depletion. I say type of this practice; for nothing is more varied than is the treatment in different hands of this *erysipelas*, the disease concerning which I am going to speak.

The local phenomena of erysipelas are characteristic. They are often, indeed generally, preceded by a sensation of chilliness, or coldness of the skin, which is soon followed by some sense of heat, occasionally itching; the redness gradually extends to a greater or less distance, accompanied by a general enlargement of the limb, or swelling of the part, or both. We can neither trace the exact boundary of the swelling or of the redness; but both seem to be gradually shaded off, as it were, till we arrive at the hitherto healthy district of the limb. At this time, there is some evidence of general excitement. The pulse is usually frequent, and with a degree of sharpness in its beat; and, if the arm or hand be affected, in addition to the characters I have mentioned, the pulse will be stronger and even fuller on that side. You may have the pulse either hard or not in erysipelas: the characters above mentioned are the most constant. The tongue is furred; the bowels usually tending to costiveness; and, if their secretions be examined, they will generally be found unhealthy; the appetite fails; but this is by no means invariably the case in this stage of the disease. Sometimes there is tenderness on some district of the body, as the epigastrium or right side; so is there pain in the head; sometimes a distressing prostration of strength, the patient saying you could "knock him down with a feather." In short, the indications of general indisposition vary in kind and degree; but they

are constantly present in some form or other: the main point is, that the evidence of general disorder is always present; nor is the seat of the cause of this indisposition, in general, difficult of discrimination, if we examine with the requisite attention.

If the disease is to proceed, the swelling and redness increase, the latter generally assumes a somewhat deeper shade. We observe elevations of the cuticle (blisters); the subjacent skin gradually sloughs, or sometimes opens partly by sloughs and partly by ulceration; and matter ill-formed, blood tinged with shreddy sloughs of cellular tissue, are discharged. These matters continue to be discharged for some days, usually attended by loss of more skin, either by sloughing or ulceration, or a mixture of the two. At length, however, the redness and swelling begin to diminish; and granulations begin to form in the wound: these gradually occupy the destroyed surface; new skin commences to form at the edges of the wound, which now heals slowly, but in the usual manner.

As I still have a great deal to say on the treatment of this complaint, I merely advert to erysipelas here, so far as is necessary to the argument I am pursuing, with a view to develop the real causes of inflammation. Now, whether erysipelas occurs spontaneously, as it is called,—that is, when we cannot perceive its cause*, —or when it is excited by a wound, we nevertheless see plenty of evidence that it is something in the general œconomy which determines the particular kind of inflammation; and, at all events, that there is some accompanying disturbance.

We have erysipelas sometimes affecting the skin very superficially, and not doing more than just stripping off the cuticle, and shewing a secreting or superficially ulcerated surface of the skin beneath it; and this is called erythema: sometimes the cuticle does not separate at all, the erythema gradually disappearing or extending itself to adjacent parts, whilst it leaves those it first occupied.

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* I lately saw a case which was far more interesting to me than what are generally called good cases, as marking the continued chain in which, in Nature, diseases are linked together. Mr. Leigh visited a dispensary patient, a young woman, who had erysipelas of the leg, and was of healthy appearance, but with disordered secretions, and who confessed that she was in the habit of drinking spirits. He gave her some medicines to correct her secretions; and, on its being reported that she was not so well three days afterwards, I visited her. The erysipelas had disappeared, and she now laboured under a slight form of continued fever. She did well.

In other cases, the erysipelas affects the skin, and the subjacent parts chiefly, the cellular tissue, or subsequently the fasciæ beneath it*; and then those circumstances follow that I have stated at the commencement of this section. Occasionally, the swelling, redness, pain, tension, are marked by great vehemence of action; the part becomes of a deep or even dusky red; elevations of cuticle, having black spots of skin, occur in several places, indicating points of slough; the health is very disturbed and excited; and this we call phlegmonous erysipelas,—as if it were, par excellence, that species characterized by most marked inflammatory action. But you see that I here talk of a disease, again, which occurs at the surface of the body; and, in its worst cases, seldom affects more than the skin and cellular tissue beneath it†. And, although inflammations occur in other parts which are supposed to be allied to erysipelas (and I think justly, in that they are evidently unhealthy), yet we cannot at present produce, perhaps, any example of the same kind of inflammatory process any where else but at the surface of the body.

The particular seats of erysipelas will be again considered in the chapter which expressly treats of this malady; when I shall add some further remarks on the subject of erysipelatous inflammation, occurring in other districts than the surface. In the mean time, it is interesting to observe certain points, in connection with erysipelas, as either primarily or secondarily affecting the skin. It would seem as if, when the general disorder was to be met by a light or fugitive inflammation, the actual skin at once becomes its seat, either solely or simultaneously with the subjacent cellular tissue. But, when the inflammation is to be severe or extensive, it begins first in the subjacent cellular tissue; as in phlegmonoid erysipelas, sometimes called "diffused cellular inflammation." Certain points of great importance appear to be gained by this arrangement. The *ordinary* function of the cellular tissue is *comparatively* unimportant: it is a much safer seat for *extensive* or severe inflammation than the skin; and, if the skin is to perish, the primary establishment of inflammation in the cellular tissue at least modifies the effects which experience shews to result from *sudden* and violent attacks of this important organ (the skin). Be-

* For further evidence of this, see Discourse on Erysipelas.

† I have seen a case in which the fascia had sloughed away from the greater part of the lower extremities.

sides, we find practically that, in severe cases of this kind, the actual destruction of skin is by no means in proportion to the extent of the cellular inflammation: in other words, a large portion of skin may be said to be saved by the arrangement.

In reference to the treatment of this disease, there appears to have existed, at various times, the greatest difference of opinion: some resting on a practice chiefly, and in some cases even highly, depletory; whilst others have said that support, carried even to bark, wine, and cordials, is the only judicious mode of proceeding. All this will be more fully discussed when I speak of the treatment of erysipelas: I here return to the chain I am tracing.

Here, then, is another disease, decidedly inflammatory, decidedly appearing on the surface of the body, decidedly connected with disordered condition of the general health, and in which we first see active depletion commencing to be a part of the treatment, but with these reservations,—that its strongest advocates do not deny that, in some cases, it is unnecessary, in others, it may be injurious; whilst another set of persons contend not only that it is unnecessary, but that a treatment should be preferred altogether of an opposite kind. One thing, however, they both agree in, which is a treatment which has this in common—that it is directed to produce an influence on the whole œconomy.

We have hitherto regarded, first the exemplification of that tendency of actions to the surface without any reference to inflammation, and secondly, as illustrated by a very common class of diseases, which do exclusively occur on or near the surface, and which are decidedly inflammatory.

If we follow up this appeal to the surface in another way, review our first phenomena, and enquire *what* are the diseases of the surface, we find they are characterized by inflammation, and that the illustrations are infinite; for, as I have already hinted, who shall count the various papular, vesicular, pustular, or tubercular eruptions on the skin? or who can deny that nine tenths of them—nay (if we are to extend our ideas of inflammation to increased action) all are characterized by—owe, in fact, their essential features to—inflammation? What are myriads of pustules but inflammations terminating in suppuration—vesicles, in effusion—papulæ but increased actions in the part—or tubercles but inflammatory actions terminating in thickening or deposition? That cutaneous diseases are also connected with disorders of the system is proved by the treatment required for their relief being necessarily, in the great

majority of instances, addressed entirely to the interior of the body; by the great danger notoriously consequent on their being suddenly repressed by any cause;* and by the tangible disorders of the system which either precede or accompany them, existing in so large a majority, that the small proportion of even apparent exceptions (and of which I know not any) baffles calculation. But here again I must repeat that I am only adverting to, rather than considering at large, the evidence afforded by diseases of the skin; which must necessarily be deferred until I treat of the diseases of this part as a separate subject. In conclusion, I may remark that diseases of the skin afford us another class of inflammatory actions, in which bleeding is either very sparingly employed or not exhibited at all. Yet, in various cutaneous diseases, we have heat, redness, pain, swelling, effusion, suppuration, ulceration, sloughing, as already observed—all phenomena of inflammation.

Now, then, let us begin to apply this to the foregoing argument; and let us enquire what light they afford us in regard to what is called common inflammation. By common or pure inflammation is generally understood an affection of any part of the body, in which the disturbance is thought to consist of inflammation in the part; all the local symptoms are referrible to the vascular disturbance; and any departure from the natural condition of the part—no matter what its nature—bears a proportion to the vascular excitement: I say, then, that, in pure inflammation, the symptoms are in harmony with the vascular disturbance, as to degree. For example: in the eye, we have inflammation, where, though the inflammation be trivial, the intolerance of light is excessive; and others where the vascular disturbance is very considerable, and yet there is scarcely any intolerance of light; whilst, in pure inflammations of the eye, we find this symptom in very evident proportion to the degree of inflammation. So, in inflammations of any other part—the pain in pure inflammation is in proportion to the vascular disturbance; whilst in those which we call specific this relation cannot be perceived. For example: a great deal of inflammation, and of a very serious kind, may take place in scrofula, without any pain, and often, too, in erysipelas, without any *very* great suffering; whilst in common boil, though the disturbance occupy a small district, and the destruction of parts be in-

* There is at this moment a patient in the dispensary, suffering from paralysis a fortnight after the disappearance of a boil; but analogous cases, and indeed where the connection is much more striking, are very common.

considerable, the part is often tormentingly painful. But, if pure inflammation occur—of which we see but few instances, and these chiefly the result of one kind or other of local injury—we find the pain bearing an evident proportion to the vascular disturbance.

Further: in pure, common, or healthy inflammation, we always observe that it is circumscribed. This may be in the thickening round an abscess; and, in almost every instance, its worst termination is suppuration; for, if any sloughing take place, we have more or less of departure from common inflammation; and this we see even in common boil; the excessive pain, the proverbial tenderness, the constant sloughing, always present in greater or less degree, are departures from ordinary inflammation. Sloughing hardly ever occurs from common inflammation, unless it be in consequence of the previous destruction of a part by injury or otherwise, and which therefore requires that it be separated from the body, as no longer able to execute its functions. And in common inflammation the general disturbance of the system is so little remarkable, and sometimes so imperceptible, that, notwithstanding the various links of the chain which I have hitherto been tracing point so directly to some disorder in the œconomy, we seem to have inferred that, because we cannot perceive it, no such disorder exists: yet every day (so to speak) we are examining bodies where we meet with serious diseased changes, even affecting the mechanical functions of parts which were not, during life, suspected—which should alone be sufficient to prevent us from concluding that no disorder exists merely because we cannot discover its nature: for, to suppose that disorders exist of which we can *see* no symptoms, is to suppose a common and a probable occurrence; whilst, to suppose a disease set up on the surface of the body—that is, a change in the actions of the œconomy—without some cause referring to the condition of that œconomy, is not only gratuitous, but irreconcilable with the facts just mentioned, and just as unreasonable as to suppose that a watch, which went regularly yesterday, but which loses twenty minutes to-day, would do so without some cause, merely because, not being a watch-maker, I cannot discover what that cause is.

The truth is, that we talk of pure or common inflammation; but in nature, except as instituted for purposes of repair, we seldom see it. Injuries are often followed by unhealthy inflammation; but healthy inflammation without injury is very rare. Healthy

inflammation is characterized by the processes which I have mentioned: but where do we see inflammation of the membranes, for example, present types of this healthy inflammation? Shall we look for it in the rapidly diffused inflammation of the brain, chest, or abdomen? Yet that the circumscribing character of healthy inflammation is a function, not only natural, but even characteristic of the healthy condition of these cavities, is plain from the observation of their tendency to adhesion, from the manner in which various local injuries are circumscribed by it; whilst that the limitation of such inflammation is evidently not solely influenced by the limitation of the injury, is clear from such a number of examples in which local injuries produce here, as in the skin, the dangerous diffusion of inflammation, unchecked by the healthy processes which are found to limit it.

The foregoing considerations lead us to this point—that every inflammation we have adduced seems evidently connected with some disordered condition of the system; that, in many cases, its occurrence is followed by decided relief of that disorder; and that the inflammations concerning which these enquiries have been made, however various or dissimilar their shades, have this in common—namely, that they occur at the surface of the body. We now, then, have to ask, what right we have, *a priori*, to conclude that inflammations of a pure nature, as we term them, are less exemplifications of the same laws than those which are more glaring instances. For myself, I can see no reason whatever for the assumption, unless it be that the connection on which the law appears to rest is not *equally* perceptible, or perhaps I should say not equally demonstrable.

It must be admitted that, if we expect the same kind of evidence of the connection of every inflammation with general disorder of the body or of particular organs, as we find in gout, scrofula, rheumatism, erysipelas, or the infinite variety of diseases of the skin, we shall be often disappointed; nor is the seat of those inflammations, which *we hastily regard* as specimens of pure, as they are doubtless of serious, inflammation, always on the surface of the body. If, therefore, we wish to refer inflammation generally to the same laws as those to which we would refer the inflammatory diseases which I have mentioned, we must at least shew the probability that there exists some condition of the system, or of particular organs, favouring the occurrence of inflammation, although we may not be able, strictly speaking, to demonstrate it

This is further incumbent on us, if the existence of such condition offer some explanation of the inflammation occurring apparently in exception to the law in question; that is, not on the surface of the body. In the present state of science, and still more in the *present state of medical opinion*, the task may be difficult; but it does not appear to me, if we approach the subject with our minds unbiassed by preconceived notions, to be impossible; still less does it involve any opinion that is founded on any other ground than facts, well known and familiar.

But here again we shall obtain assistance by looking at inflammation in relation to the various phenomena with which it is connected. And, first, with regard to what is called determination of blood to particular parts of the body, by which a congestion or fulness of vessels of that part is produced. Practically, *we know* that, on certain occasions, more blood is contained in certain parts than is natural to them. Of this, the brain, liver, and lungs are common examples; and, in many cases, we have decided evidence that there is a *greater action* of the vessels in parts so circumstanced.

I put these propositions separately, because the one does not *necessarily* involve the other. Activity of vessels sometimes takes place without there being more blood in the part than is natural; nay, it occasionally occurs in consequence of an opposite condition, as we observe in the throbbing which now and then succeeds severe depletion, and in those states of the system which have been so well commented on by Dr. Marshall Hall. Neither, in all states of real congestion, can we say that the vessels are really more active; so that, although the activity of vessels and congestion are often, and perhaps generally, coexistent,—it is neither safe, nor is it *necessary* to the argument, to assume that they are invariably so. If we enquire into the causes of determination of blood to particular parts, we find that they are very different in different cases,—obscure in some, and in others very palpable; while, in a few, perhaps, they altogether escape detection.

As to determinations to the head, we know that disorders of the stomach, of the liver especially, and, indeed, of the whole or any part of the digestive apparatus, do very frequently produce the phenomena of inflammation. We now, indeed, begin to see the use of studying the sympathies of the body in considering the causation of disease; but as I have dwelt on that subject at some length, it will be sufficient to remind you, that any one part may produce disorder of any other part; and, *a fortiori*, of its vascular

tissue; for we can scarcely imagine any disorder in which the circulation of blood in a part is not more or less affected.

But, if the condition of any one part can produce congestion in any other, two circumstances are immediately presented to us of great interest in the enquiry. The one is, that these effects will be most likely to be produced on an organ by any one with which that affected has a ready sympathy: the other, that, in the production of congestion, we have not only the most common, but really the *essential*, element of inflammation; for, although congestion may take place without inflammation, inflammation cannot exist without congestion,—in other words, without more blood circulating in the part than usual.

Let us then take a case. A gentleman being apparently well about three o'clock in the afternoon, feels, in the course of the evening, an uneasy sensation low down on the right side of his chest. Finding, towards the night, that it is rather worse than better, he takes a warm-bath, and loses about ten or twelve ounces of blood by cupping from the part, but without experiencing any relief. He goes to bed, however; but towards three or four o'clock in the morning, he finds that his pain has increased; he has had no sleep; and, moreover, his breathing, which had been short and painful, has become so restricted, that he can only breathe by very quick and short intervals. He sends for his medical man, and desires that he may be bled. After his medical man has duly examined the case, he concurs in the measure, and abstracts a large quantity of blood; in the case alluded to, fifty ounces. He is exceedingly weak, so as to suggest the expediency of administering a tablespoonful or two of gruel; but he does not actually faint. Well, he is kept quiet; his bowels opened by saline aperients, and calomel and antimony; his symptoms, relieved but not entirely vanquished by the bleeding, gradually subside, and he gets well.

Another person, travelling in an open carriage, feels chilly, and is attacked, soon after his arrival, with similar symptoms, followed by similar results.

A third, similarly circumstanced, from the same cause, or from having got wet in his feet, is similarly affected; is less fortunate, and dies; and examination discovers the results of inflammation, of which I have formerly spoken.

Now let us endeavour to see what these cases teach. In the first case a very large quantity of blood was lost; the secretions were acted on; the supply diminished, and the patient recovered.

Yet a number of circumstances shew that the quantity of blood, though it might be the predisposing cause in such a case, was not the real cause of the malady; for, on the morning of the day on which he began to complain, he had no symptoms of inflammation; and yet we cannot suppose him to have had less blood at that time (especially if we take a reasonable time after breakfast) than he had at three o'clock in the afternoon. Yet, if the quantity of blood had been the *direct* cause of the malady, it must have been so. Well, then, you will say it was the predisposing cause. Supposing we admit this, as probably it was; what induced the determination of it to his lungs, or rather to his pleura? since whatever that was, I take it to have been *really* the cause of the inflammation; and, moreover, that if that cause could have been discovered, and successfully administered to, he would have got well, even though such ministering had not involved any bleeding at all.

I need scarcely observe, that inflammation occurs very often,—in fact, always, so far I know,—under circumstances in which it is impossible to refer it to any sudden increase of the general mass of blood, or to any quantity which can (abstractedly) be regarded as a necessary cause of inflammation. The very cases, each carry with them their own proofs that we cannot do this; since, not in one case in a hundred, can we, with the least probability, say that the general mass of blood was greater when the inflammation commenced, than it was immediately antecedent to its earliest symptom. On the contrary, in many cases (in which the inflammation is most clearly demonstrable), we are certain that the quantity of blood must have been greater before the inflammation was induced, because we find that the loss of a very considerable quantity, in many operations, is by no means an absolute security against the supervention of inflammation.

It is therefore certain, that although the absolute mass of the blood may dispose persons to the occurrence of inflammation, yet that there is some other link in the chain of causation, and that this link is a more essential element than any relating to the quantity of blood. Because, whilst inflammation occurs often enough without any general fulness of the system; so general fulness of the system is common enough without any inflammation. We must, then, look for this element elsewhere than in the absolute quantity of blood; and a more auspicious direction will evidently be that which determines more blood than usual to a particular part; because that is, as I have before observed, a really essential

element in inflammation, inasmuch as *no one ever saw inflammation without it.* If we could discover this, we should find, in all probability, that as the general quantity of blood in the body is not the essential thing to be considered, so a *general diminution* in that quantity is not the essential thing in the treatment. This we should rather be led to regard as consisting in the restoration of the equilibrium of the circulation, or an equal distribution of the blood; and thus we should at once understand how we might relieve many inflammations, either with very moderate abstractions of blood, or without any bleeding at all; and also, how it happens, that in cases wherein we bleed most largely, we are often unsuccessful.

If the essence of a disease consist in more blood than usual being in a part affected, we can readily indeed see that diminishing the general mass of blood in the body must have a manifest tendency to diminish the quantity of blood in the affected part; but it is reasonable to suppose, that, in drawing the blood from every part of the system, to relieve one particular part, organ, or district, we must incur some risk of doing mischief, if indeed we are to regard the unnecessary abstraction of blood from parts as of any consequence at all. Now, experience shews that this anticipation is founded on fact. Repeated observation has proved, that a very serious, enduring, and distressing class of maladies, prospectively, are not less really engendered by the abstraction of large masses of blood. The circulation becomes extremely disordered; the nervous system very seriously deranged; determinations of blood to particular parts take place; and a state of system arises, not distinguishable from a very opposite condition, simulating, in fact, a state of plethora.

The remedies, however, employed for a plethoric condition, are not only not adapted to this state, which so simulates it, but they are highly prejudicial; in fact, they materially aggravate the malady. I have seen examples of this myself; but the profession and the public are, as far as I know, indebted to Dr. Marshall Hall for first compelling attention to this important subject. Reasoning and experience, therefore, alike impel us to the suspicion, that, however we may succeed in removing the immediate danger of inflammation by the copious abstraction of blood, we are not adopting the best remedy; and that in many, even of our (so called) successful cases, we can hardly be said to cure the patient; since we relieve him from immediate danger, at the expense of entailing

on him a disposition to plethora, an irregular state of circulation, and a variety of other distressing symptoms arising therefrom.

Nor must it be forgotten, that even this success is not constant: cases are always occurring, in greater or less frequency, in which, however powerfully combated, inflammation destroys the part, or the patient, accordingly as it is seated in parts more or less essential to vitality. Now, although my meaning will sufficiently appear when I speak specially of treatment, I wish, at this stage of the enquiry, to guard myself against misconception. I wish *not* to be understood as advocating the *relinquishment* of bleeding in inflammation. When a patient's life is in jeopardy, it is undoubtedly our duty to regard the safety of the individual as that into which all other considerations must necessarily merge. Though we were ever so convinced of the prospective objection to the abstraction of large quantities of blood, still, in the *real absence of other remedies*, we are bound to administer that, or any other, which experience may have hitherto proved to be the most effectual with which we are acquainted. It is as if a man were drowning, and we could reach him only by means of a grappling iron, or some instrument which involved the risk of injuring him: this would not deter us from dragging him out of the water.

The conviction, then, that a remedy does not administer to the cause of disease, or even that it is proved by experience that it may entail injurious consequences, should not hold our hands from employing it where life is in danger, so long as science *may not have* made sufficient progress to supply us with a better. Nevertheless, it is very important that we should be alive to these objections; for in the perception of them lies that of the imperfection of our science; and, unless this be perceived, we can, of course, never hope to improve it. This is so important, that it is, in fact, the mainspring which often forces on us the necessary observation and reflection on which all advance must necessarily depend.

The history of mercury exemplifies this in a very remarkable manner. The frequent failure in the object it was designed to accomplish, and the deplorable states of system it so often produced, together with occasional peculiarities of constitution forbidding its employment, have been the chief circumstances which have led to what (notwithstanding the present extensive abuse of that mineral) must be regarded as an improvement in the adjustment of its claims in medical science. But "Incidit in Scyllam qui vult vitare Charybdim," applies with great force to the history

of this mineral. In avoiding the outrageous and unnecessary employment of it in syphilis, men have fancied that they have discovered a more enlarged use of it, as extensive as was its application in syphilis itself. Thus, though now mercury is wholly withheld, or employed with great caution, in syphilis, it is administered for a thousand other complaints, in *many* of which it is entirely unnecessary.

Returning to inflammation :—it is clear that its most essential element is the presence of an unusual quantity of blood in a part; and it may be thought that it would be an improvement on taking blood from the general mass, if the blood were taken from, or as near as might be from, the part affected. We see indeed something in the phenomena of local bleeding which inclines us to think that this is the case. A given quantity of blood taken from the part, or its immediate vicinity, has a much greater effect in subduing inflammatory action than the *same quantity*, or indeed commonly a much larger, taken from the general system.

Still, in serious inflammations, we dare not trust this mode of proceeding; because experience shews, that if we take blood from the part, the same cause, whatever that is, continues to send in a new supply: and we are led to conclude, that, in severe inflammations, we can only combat this excessive action of the parts by reducing the powers of the system altogether. But the more we consider the subject, the more distrustful we become in regard to the abstraction of blood (considered as such) being the thing required: and the more we are led to refer its salutary operation, as regards its immediate effect on the inflammatory disturbance, to other circumstances, including that general reduction of the vital forces which it produces in common with many other modes of proceeding,—we perceive, also, that even when we do combat inflammation by *the reduction of the powers* of the system generally, the reduction of power, and not the mode by which it is accomplished, is the essential thing. The reasons are the following: in estimating the effect produced on inflammatory action, by general depletion by blood-letting, we can in no case safely establish any proportion between the quantity of blood abstracted and the effect produced on the inflammation. Thus, in prescribing rules for bleeding in important and dangerous inflammations; as those threatening the integrity of an organ, as the eye; or those dangerous to life, as of the chest &c.; we cannot direct the student or practitioner to draw twelve, twenty, thirty ounces of blood, nor

indeed any other quantity. We say that he must bleed to affect the system, and cause the patient to faint, or give other very unequivocal evidence of reduction of power. It is to be further observed, that this reduction of power is not sought even, *only* in relation to the quantity of blood; but it equally regulates our *manner* of abstracting it. For we do not find that the effect on the inflammation bears any appreciable ratio to the quantity of blood abstracted, but to the depression induced by it; and we avail ourselves of the circumstance in order to *economize* the depletion.

When we endeavour to subdue inflammation by bleeding, we bleed in a manner which has for its object the induction of fainting, or of a state approaching to it, by the loss of the *smallest* quantity of blood: thus we bleed from a large orifice, because experience has shewn that the rapid abstraction of a given quantity of blood depresses the actions of the system more than perhaps double the quantity would do were it drawn slowly, or at repeated bleedings. Hence it arises, that, when we do bleed, the mode which I shall recommend for this purpose,—though, in appearance, it be bold and severe,—is, in truth, that which most strictly economizes the strength, and secures the safety of the system. As general bleeding acts on the increased actions of inflamed parts, by means of lowering the actions of the whole system, it is apparently paradoxical, that general and local bleeding, though they both abstract blood from the system, and, in many cases, both relieve inflammation, yet really appear to act on a different principle; the general bleeding, by lowering the whole actions of the system, and consequently of the part itself; the local, by relieving or temporarily removing a state of local congestion—a state which, though not the cause of inflammation, is a necessary element in its formation.

Local bleeding, however, opposes congestion in a way which does not necessarily act on the circumstances which determine the blood thither: so we see why it can rarely, if ever, be trusted to in inflammation. Whereas, inflammation being essentially a vital process, no matter what its nature may be,—and general bloodletting, carried to a certain point, reducing all vital processes,—we readily perceive why its effects should be very different from those of local bleeding; since this is rarely (and, of course, it is only on this mode of its employment that I am speaking) carried to such an extent as to affect the constitution. When it is, then, necessarily, its effects become like those of general bleeding, instituted as

such; but usually with a much greater expenditure of blood. This is particularly exemplified in children. But to resume the question of blood-letting in inflammation, with a view to throw some light on the nature of that process. I say it appears to act by reducing the power of the system, and not by any specific mode attributable to the fluid as blood. This is further illustrated by the action of other remedies; for, if we can reduce the actions of the system, we feel that it answers the purpose of blood-letting; and that, in fact, if we can get parts to pour forth their secretions in a very copious manner, this is often equal to blood-letting. It might be objected that this is just as much a depletion as blood-letting: so, in truth, it may be in some cases; but that it does not depend on the depletion, appears from any excessive evacuation being by no means an essential condition; for, if we can depress the actions of the system, no depletion at all (reasonably to be regarded as such) is necessary.

The action of tartrate of antimony, in all the phenomena which it presents, is highly instructive in this matter. In the first place, the action of tartrate of antimony, in reducing the action of the heart and arteries, is well known. The application of this power, in the treatment of inflammation, is equally incontestible; and, what is more to the point, the abstraction of blood, no matter to what extent it be carried, by no means precludes the necessity of the use of tartrate of antimony, or other means adopted with a similar intention. I merely take the tartrate of antimony, in this enquiry, as a remedy most familiar and striking. On the other hand, tartrate of antimony will do without bleeding in many instances; and although, where the tartrate of antimony is employed, it must be admitted that bleeding is also commonly practised, yet, in *many* cases, it is either not employed at all, or in such a measured manner as not materially to obscure the effect which tartrate of antimony has in subduing the actions of the system, and, through them, the action of parts labouring under inflammation*. To resume our consideration of blood-letting in inflammation, as assisting us in the investigation of that process, let us discuss the

* But this by no means conveys the real mode in which, after all, tartrate of antimony does good; since it is one thing to stop inflammation by subduction of power, and another to institute conditions which are calculated to direct that power aright. The determination to the surface, occasioned by tartrate of antimony, seems the essential thing. See "Treatment," and especially what is observed in regard to mercury.

manner, and, what is more to our purpose, the circumstances under which Nature may be said to bleed; for, if blood-letting do not minister to the cause of inflammation, but operate indirectly, as it were, and therefore be a remedy which (as regards the real causes of inflammation) arises out of our ignorance of a better, rather than our knowledge of the true nature of the disease we endeavour to relieve,—a contemplation of this remedy, when employed by Nature, must do something with the propositions implied in the foregoing enquiry; that is, it must either tend to establish or overthrow them.

Now, that a fluid, so elaborately made as is the blood, requiring such a vast apparatus in all animals for its production and distribution, should be otherwise than economically managed by Nature, is contrary to all analogy. Because, in all parts essential to vitality, it is the habit of Nature, if I may so say, to guard them with peculiar care; and hence copious, spontaneous discharges of a fluid, like the blood, is certainly one which, suppose we had no experience on the subject, we should, *a priori*, not be disposed to anticipate.

When, therefore, we find that Nature does create, somehow or other, a discharge of blood from the system,—and that, too, in some cases, in considerable quantity, and not as a process natural to the healthy œconomy, as in the case of the menstrual fluid, but evidently as an occasional supervention on and with relief to a disease,—it is obviously necessary to examine how far it is a natural remedy, in the true sense of the word, and how far it is one to which Nature is driven, not so demonstrably perhaps, but scarcely less certainly, than when one of the vessels by which she distributes the blood is opened by mechanical division.

Now, if blood-letting be calculated to assist us in removing disease, it is evidently a remedy requiring much discretion in its employment; for it is revolting to common sense to suppose that the abstraction of this fluid can be (in any quantity as to affect the system) a matter of indifference; yet it is not exceeding the truth to say, that no remedy has ever been employed with less discretion, nor any measure contributed more to lull investigation, or to obscure enquiry into the real nature of disease. Men practising under traditional or conventional authority (the idols of the market-place and theatre of Lord Bacon) have contentedly employed a remedy which appeared to relieve *symptoms;* and, in case of failure, have as readily attributed it to causes which our ignorance could not penetrate, or as an exception to a general rule: and in

the continuance of this error, the subject which we are now about to examine,—namely, the fact of Nature herself occasionally bleeding,—has perhaps greatly contributed; whereas, carefully examined, it will be found not only to impress us with that discretion in its employment which growing experience never fails to produce, but may assure us also, that just as we employ it in inflammation, so Nature uses it to relieve symptoms where she is demonstrably prevented by adopting that which would really be her own mode; viz. removing the cause.

Now what are the phenomena presented to us in spontaneous discharges of blood? and, in considering these, we will take the most common examples; because facts should be trite, if people are to reason together. I presume, as admitted, that the most frequent examples are presented in bleeding from the nose, and from the vessels of the rectum in hæmorrhoids.

In the first place, the blood is discharged in moderate quantities; for, although the aggregate quantity is often very considerable, yet it is *generally* discharged in small quantities at a time. There is no estimating the absolute amount in those who are habitually subject to bleeding from hæmorrhoids; but it must be, in some cases, very great in the course of a certain number of days or weeks.

It is true also that, in some cases in which the causes are allowed to operate altogether uncontrolled, the discharge of blood, both from the rectum and from the nose, is very profuse; so copious, indeed, as sometimes to threaten, and in rare instances to destroy, life: I have seen this happen in bleeding from the nose. I was sent for to a man who laboured under this complaint (technichally termed epistaxis), whom I found in the last stage of exhaustion: the hæmorrhage had indeed ceased when I saw him; and, notwithstanding that its recurrence was prevented by plugging* the nose, as it is termed, yet he did not recover.

The same results have been said (though still more rarely) to follow bleeding from hæmorrhoids; but of this I have never met an example. Notwithstanding, however, for one cause of fatal hæmorrhage from such sources, thousands—perhaps I should scarcely exceed the truth if I said millions—occur in the way I

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* Passing a cylinder of lint sufficiently large to occupy the passage along the floor of the nostrils, as far back as the palate, by means of a probe.

first mentioned; that is, in small quantities—and often, let me add, with *marked* relief to some sensation of disorder.

But let us examine the cases; and, first, let us discuss the case of hæmorrhoids or piles; because, whilst the case is common and known to all, no *one* has perhaps led to more erroneous conclusions; since, of the mischiefs so commonly known to result from the stoppage or sudden cessation of natural hæmorrhages, no one class of cases has furnished more numerous examples.

We are here struck with the analogies afforded by the bleeding from piles with those presented in the practice of blood-letting, in that, although both relieve symptoms and parry danger, yet neither one nor the other administers to the *real* cause of the disease. Piles are always connected with either a local or general plethora; and we will first take a case where the fulness may be regarded as local, and seated in the liver—a most undoubted cause of turgescence of vessels and hæmorrhoids in the rectum. Now, when we see how the great vein of the liver (vena portæ) is formed, we immediately perceive how bleeding from the rectum must necessarily relieve the circulation of the liver; but it is equally clear that it does not strike at the root or real pabulum of the evil; since, although it diminishes the turgescence, it does not minister to the cause of that turgescence, but only to its mechanical diminution when once it has been induced.

When we inquire into the causes, we find ourselves unavoidably driven to consider all those which disturb the œconomy of the liver, whether as regards the quantity or quality of its blood, or those which act, in some way or other, sympathetically to disturb its functions. We know these to be, full or improper diet, luxurious living, indolent habits, want of exercise, moral causes, and other conditions of certain organs, with which the liver may hold especial sympathetic or mechanical relations, as the head or heart, for example.

That these are the real causes, experience very impressively teaches us; for, whilst no bleeding, either natural or artificial (a mode much used on the Continent), from the rectum, will prevent the recurrence either of the piles or the bleeding, cautious diet, exercise, regular bowels, and in short the removal of the various causes, will do both, as I have known in a number of instances; whilst, where the heart is diseased, the piles remain, because we cannot cure certain conditions of that organ. We know also that a *general* fulness of the system is exceedingly prone to produce

fulness of the liver, and that piles are the frequent result; but, in this, as in other cases of the same kind, if we seek to *relieve* the piles, as we are often called on to do, as they produce occasionally great suffering, we direct poultices, recommend the horizontal position, &c.; but, if we aim at the prevention of their recurrence, we must subjoin other measures. We must prohibit excesses of all kinds, enjoin abstinence from fermented liquors, recommend exercise, regulated temperature; in short, a preventive plan, such as common sense and experience alike shew to be effectual in promoting and maintaining an improved condition of the general health.

We learn that, with the sustained observance of these measures, patients remain well, and that, in their absence, all other measures are but palliatives; that either the disease returns, or that maladies still more protracted and dangerous are substituted for them. Why Nature does not institute these remedies is also clear; because we put it out of her power: and, in so doing, it is to be observed that the inclinations or appetites of the patient are scarcely more influential than are the erroneous applications of (so called) medical science.

These are the arguments severally used on such occasions. If people are warned by pain, oh! they must eat, to support their strength; if the suggestions of Nature consist of loss of appetite, nausea, or sickness, the tone of the stomach must be maintained by tonics and things of that kind. An active dose of calomel, to emulge the liver, aperients for the bowels, and columba, gentian, bark, or something of that class, for the stomach, are the ordinary exhibitions of science: a few days' starvation may perhaps sometimes be superadded. These privations, grievous as they are considered, are perhaps regarded by the patient as far preferable to habitual moderation; and the amendment, though not permanent, is rapid: and thus, unfortunately, whilst it is more acceptable to the patient, it is, to say the least of it, regarded quite as creditable, and generally more so, to the character of his medical attendant. Nature, therefore, finding her hints disregarded, which are generally given by the stomach, ever abundant in resources, sets to work in another way, and generally by the next best; that is, the evacuation of blood by the most direct channel; for, if unwillingness to make more supply, as manifested by the stomach, be artificially stimulated into activity, if, in short, she be forced to make fresh supplies, it is obvious there are but few safe modes of getting rid of them; and a very direct mode is the one in question.

Even in cases where it becomes expedient to remove diseased growths, all of which will be more fully discussed at the proper time, we see the *real* causes of these maladies, and the necessity of administering to *them*, if we are to obtain permanent relief for the patient. Take the following case as an example: A lady had been suffering for seven years from that form of piles in which occasional bleeding had been followed by repeated descents of small portions of the lower bowel, which, in the course of time, had undergone change of structure, many of them having become covered with cuticle: she had had a great deal of advice and medicine, and with temporary benefit; but she had continued to get worse and worse; so that, as happens in severe cases of this kind, she had not been able to sit down for a long time without some provision to avoid pressure; and even with this provision she would often suffer great pain. As somebody told her nothing would relieve her but an operation, she sent for me; and at this time there was a congeries of hæmorrhoidal tumours, about as large as an orange: they often bled profusely, and were exquisitely tender. The moment I saw her, it was evidently absurd to expect any permanent good from an operation in her present condition. She had scarcely any function going rightly; her liver was especially out of order; and her general aspect exhibited a yellow paleness more characteristic of a person with dropsy from diseased liver than any thing else. I therefore began to regulate her liver, her bowels, and to act on her skin. She had daily enemata of warm water, and a spare and simple diet. Under these measures, the tumours began sensibly to diminish, until at length the operation, which, at an earlier period, would have involved the removal of a large, irregular tumour and considerable suffering, was really, when undertaken, a mere nothing,—a couple of strokes of a common pair of scissors being all that was necessary and even this; I verily believe, might have been avoided by continued perseverance in the measures she was employing; but, as I wished her, above all things, to get exercise as soon as she could, I removed the parts so diminished; and she has remained perfectly well, though, on one occasion on which I saw her afterwards, she was beginning to relax as to the observance of regular exercise.

I have known many cases of a similar kind, and of many years' longer duration: but I will not interrupt the thread of our argument by the relation of them in this place. I have also known

these tumours removed without the required precautions, and soon followed by other diseases.

Now, if we apply the foregoing observations to our mode of bleeding, we are immediately struck with the parallel, I should say the identity, of the two cases, as regards their essential principles. There is, however, this remarkable difference—that *we* bleed because we are contentedly ignorant of any other mode of relieving the symptoms; whilst Nature does it because impediments are thrown in the way of her more effectual and salutary operations What I have been here applying to a plethoric state of a particular organ (the liver), equally applies to spontaneous bleeding, where it appears the result of general fulness. The real cause is here the regulation of the supply of blood to the system: but here again bleeding, cupping, and temporary abstinence, are preferred to habitual moderation; and, what is worth remarking *en passant*, disorders are frequently engendered which may well be amongst the most puzzling, since they consist of certain tortured conditions of the œconomy, the offspring of art, and therefore can be referred (only through an immense increase of difficulty and obscurity) to the laws or operations of Nature: whilst thus treated, the body often gets into a state where bleeding, natural or artificial, becomes perhaps, in the end, the only remedy.

Organs, constantly disturbed in their functions, at length become diseased. The liver or heart, for example, becomes changed in its structure. The former, from being, in a healthy state, the largest organ in the body, may become so changed, that perhaps but a small portion of it may retain its natural character and powers. The heart, most admirably constructed for a function very complex in its natural character, has its mechanism interfered with: its power becomes too great; the blood is circulated with too great a momentum, or it becomes diminished, it can no longer impel the blood with the required force, and then the circulation either fails in the extreme parts, or it is effected only by alternations of violent, unnatural excitement, with conditions of torpor or inaction. Besides its power, its mechanical apparatus becomes disordered: its valves become thickened, they act imperfectly; it is out of order as an hydraulic instrument; and thus we have the elements of continual disturbance: and now we have increased susceptibilities to disorder, this susceptibility allowing disorder to be excited by very trifling causes.

The means so neglected, once so efficient, now prove only palliative; that moderation which, to a sensible man, scarcely implied any rational sacrifice, is now not only essential, but is converted into habitual abstinence; and even this will not ensure (in the deranged condition of the respective organs) any certain or durable immunity from disturbance. Even the food necessary to the support of life becomes inconsistent with comfort; and now indeed we are reduced to palliatives from necessity; since, in the present state of science, we know of no means of curing organic disease in organs the continued function of which is absolutely essential to life. It is true indeed, that, in this lamentable state of things, with unavailing regret at the past neglect, we still see types of the efficacy of that treatment which rests on endeavours to relieve a labouring organ from its functions, in that those endeavours are still the best we can adopt; but we are obliged, now that the power becomes so limited, to take blood occasionally perhaps, or look with satisfaction to the same remedy as the occasional effort of Nature; because, so diminished is the power, so destroyed the equilibrium between the powers of the stomach and other organs, that all practicable diminution of supply will not obviate the necessity of occasionally relieving the circulation by direct abstraction of blood.

I shall not enter much into the history of bleeding from the nose, another frequent example of hæmorrhage; because, *mutatis mutandis*, the cases are the same. Bleeding from the nose may occur from causes *primarily* affecting the head or other parts, as the stomach, liver, &c.; but in these cases the real cause is the disorder which determines this bleeding,—the real cure, its removal. There was lately a case in the Dispensary, where bleeding from the nose occurred in connection with determination of blood to the head, and with other symptoms of partial circulation. The man's nose was plugged, but the plug only remained a day. Measures however were instituted to equalize the circulation; especially, in this case, the use of the steam bath; and no bleeding recurred, notwithstanding that it had frequently happened before. The congestion in the cerebral circulation, for the relief of which this natural bleeding is commonly instituted, may be relieved by it: but here again we see, by reasoning, and, what is to the point, we have it confirmed by experience, that the bleeding only ministers to a symptom; the real cause of the disease is left untouched; that being whatever caused the determination of the blood to the head. Nor does it

alter the argument one iota, if we suppose the cause to be one which possibly is not uncommon,—viz. where the hæmorrhage takes place from direct sympathy of the mucous membrane of the nose* with the continuous surface of the alimentary canal, or some other part, without any *intervening* disturbance of the cerebral circulation, *integrally* considered; for the cause is evidently that circumstance, whatever it is, which produced the disturbance in the organ which the bleeding from the nose is instituted to relieve.

Natural bleeding may of course take place from any surface, in consequence of lesion of that surface; but this is a different thing. These cases carry with them their own explanation. But as all processes of Nature, whether resulting from accident or otherwise, generally evince uniformity of plan; so the occurrences which are observable when an artery is divided by accident, present certain types of that sustained tendency in the œconomy to save the blood.

When we consider the heart, with reference to its mechanical power, and the hydraulic relations which are established between it and the vessels, as essential to the freedom of the circulation, one would certainly, without experience, be inclined to believe that the actual division of an artery would *necessarily* be fatal; for, with an open vessel at one end, and a powerful pump at the other, one sees no reason, *a priori*, why the bleeding should not indefinitely continue: but we find that this is by no means the case, and that, in fact, for this fatal result, a number of conditions are necessary, which are not *always* combined when arteries have been intentionally divided; and, what is still more interesting, much less frequently where they have been injured by accident. When diseases of arteries are considered, these circumstances must be particularly described. But I may observe, even here, that the *timely* faintness, the *contraction* of the artery, and the *coagulating* tendency of the blood, are all circumstances calculated to restrain hæmorrhage under circumstances where it would seem unavoidable. The scientific or professional reader will see how readily this argument might be extended; but I have perhaps said enough to shew that the true light in which we should regard spontaneous discharges of blood, is, that it is a remedy to which Nature may be said to be driven, rather than as adopting, in the *free* exercise of the preservative powers of the animal œconomy: that, like other

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* See Sympathy.

remedies adopted by Nature, though it is the least injurious perhaps in the particular cases, yet it is only so because the proper mode of relief is prevented by injurious agencies, superinduced on her operations by ignorance, art, or inclination, as the case may be: but that, inasmuch as it does not minister to the real cause of the disease, so is it not successful; that it is at best a palliative, and even, in some cases, a disease scarcely less formidable than that which it tends to relieve; all of which would be inconsistent with the laws of Nature, were it not probable that it is a remedy adopted under circumstances of restraint or coercion. We further learn, however, that notwithstanding that occasional examples of the last remark do undoubtedly occur, yet, in the vast majority of cases, it is adopted with apparent caution, or, at all events, with a practical œconomy of the expenditure of blood. We find, from other sources too than natural bleeding, that loss of blood is a costly remedy; and every day's experience is enforcing, very impressively, this conviction.

We know now that large abstractions of blood, though their effects are not always immediate, often seriously influence the future conduct of the circulation; and I cannot help thinking that we are progressing towards a very important discovery on this subject, not only as regards its bearings on inflammation, but on the treatment of diseases in general.

In relation to the different modes in which local bleeding acts, I would remark that suggestions, arising out of the consideration of hydraulics, seem to offer some explanation of the greater benefit arising from the abstraction of small quantities of blood drawn from or near the inflamed part, as compared with those arising from *the same quantity* drawn from the system at large. If I open a certain number of vessels on the skin covering the side or the site of an inflamed part practically, I determine the blood to the particular tubes on the surface. To effect this, however, I must somehow or other increase the size of those vessels, or the momentum of the blood moving in them. Now, that opening them has no tendency to increase their size, is clear; therefore we must examine whether we increase the momentum of their contents. This can only be done by increasing the power of the heart in regard to these particular vessels, which, in a direct sense, is obviously impossible: or, the power of the heart being the same, we must lessen the resistance in those particular vessels; which, practically, is the same thing. Now this, I conceive, we actually

do when we open the vessels by leeches, or in any other way: *that* blood which first flows out of the vessels meets with less resistance than it does whilst in the vessels whence it flows; and the blood will, on hydraulic principles, go where it meets with least resistance; and thus I *practically* determine blood to the vessels so opened. Indeed, inflammation itself implies the presence of a similar principle; since, whether we regard its primary condition as an increased action of the arteries or their contents, or as an enlargement of those vessels, they alike afford hydraulic facilities to the egress of blood into the part,—the essence, in fact, of that congestion, more or less of which is necessary in all inflammation whatever.

From the foregoing observations, it appears that we cannot look for the real cause of inflammation in the part inflamed; that although congestion of blood in the part is an essential element in inflammation,—and that though determination of blood to a part is a necessary condition to such congestion,—yet both one and the other are parts of, and not causes of, the inflammation: the real cause being that which determines the blood to particular parts, in the first place, and which further determines that the use to which such blood is converted, or the sequence of each determination, is to be the production of inflammation. I have already shewn that there is an obvious tendency to determine various actions, which we call disease, to the surface of the body; that inflammations of various and apparently of very dissimilar character have their seats at or near the surface; and that, in a variety of them, and those too most frequent and familiar, the effect is, in the main, demonstrably an effort to relieve the system of something which disturbs the animal œconomy.

We further infer its salutary tendency to be most safely exercised, as it occurs on the surface, from what we know when it attacks various organs more deeply seated; inflammation in such cases always proving highly dangerous; and unless the organ be previously, to appearance, sound, that is, not obviously changed in structure, it is almost invariably fatal. I believe that I am here stating the general conviction of the profession; but certain it is, that it is emphatically my own. I always regard inflammation in an organ, previously known or suspected to be changed in structure, to be in the highest degree dangerous, and, in fact, always justifying a very unfavorable prognostication. The patient can neither bear the inflammation nor that reduction of power *usually*

involved in all the *present* modes of opposing it: and I am so confident on this point, that I have foretold the consequences of such an attack where I knew an organ to be enlarged, although the presence of apparently the most perfect health was calculated to lull suspicion, and that vigilant caution on the part of the patient which it was the object of the opinion above stated to rouse and sustain. Of all cases these are the most important in reference to improved modes of combating inflammation. (See Treatment.)

The danger of inflammation in internal organs must always be great; since one of the invariable effects of it is to suspend or to embarrass the function of the part in which it is seated. Now we cannot suspend the functions of vital organs, nor, indeed, impede or embarrass them for other than a very short time; whereas, those of the skin, *cellular tissue*, and even the mucous lining of various canals, can be embarrassed or suspended, not without great suffering truly, but, as we practically find, with comparative impunity. In speaking of the skin, however, I only mean parts or districts of it; for no organ can be less safely embarrassed as a whole than it, as severe burns impressively teach us: but then we never see it *wholly* inflamed: the only case we have approaching in its effects to this state of things, occurs in fever, which is a striking illustration of the foregoing observation. Fever does, it is true, sometimes terminate in inflammation near the surface; but then it is always partial, the result being inflammation and abscess of some particular district; the parts involved being skin and its elastic substratum, the cellular tissue, as in abscesses following fever: the parts being usually affected on the inverse order in which I have mentioned them.

We now, then, are to consider what it is in inflammation that determines the blood, and the actions consequent on such a determination, to this or that district. We have seen that, in gout, scrofula, rheumatism, erysipelas, boil, and carbuncle, there is an evident disorder of the system; and therefore we assume, that if this disorder cause these particular kinds of inflammation, there is no reason, to say the least of it, why it, or some other disorder of the system, should not give rise to any other variety.

In relation to this assumption, as apparently not the direct result of induction, it should be borne in mind that similar local processes result from *apparently* different causes in the animal œconomy, where the *real* cause is the same: for, *in regard to the law of inflammation*, the question is, not what *substance* deranges

the animal œconomy, or what *organ* disturbs it, so much as, is the œconomy disturbed? When the œconomy is disturbed by alcohol, or gorging the stomach, or by opium, in *certain cases*,—though the agent be different, the manifestations are the same;—on the contrary, the same injurious agent will produce different manifestations of disturbance. Thus, ipecacuanha will purge in one case, vomit in another, induce perspiration in a third, depress the heart in a fourth, and all of these in a fifth case. But in all these cases the results have one thing in common,—viz. the disturbance of the œconomy. Now, in regard to local inflammations already mentioned, the peculiar cause may be different; so its peculiar local demonstrations: but they both have this in common,—viz. general disturbance and local disturbance,—that disturbance being inflammation.

I say, then, we assume the foregoing for the moment, in regard to any variety of inflammation, because it is the most reasonable assumption: other grounds on which it is founded we shall examine presently. As a primary assumption, we must either refer common inflammation, as it is called, to the influence of the same general laws, or we must assume that it results from different laws. Now, to do this would at least be contrary to analogy; for what have we been doing in the catalogue of inflammations already presented?—why nothing else than reviewing all the visible inflammations with which observation has furnished mankind, that which is called pure inflammation only excepted. This is strictly true; because, although we certainly do meet with inflammatory disturbances which we cannot call either gout, carbuncle, boil, erysipelas, &c., yet we never find any difficulty in referring it to one or other of these several examples of inflammatory action. Language is very inadequate to express various shades and alterations of disease, as it is to express every kind of idea; as Sir James M'Intosh said in regard to philosophical disquisitions generally; so, in regard to disease, "we work on a very delicate subject with very coarse tools," or words to that effect. In diseases, we find every variety with which we are acquainted gradually shaded off into the next cognizable or marked link in the chain of its relations; and we are only able to designate the more obvious varieties. To give a disease a name, is, in fact, very often impossible; although it is to be feared that the public frequently attach great confidence to those who have tact enough to make one on the moment; which reminds me of a story at the Hospital, concerning a pupil who, bothered

by a woman to say what her disease was called, said it was a "cacoethes loquendi," with which the woman seemed highly delighted.

Should we then be disposed to consider that purer inflammation, which unquestionably affords the best proofs of the powers of Nature, as an exception to the laws which prevail so extensively in the animal œconomy, and which are so plainly accompanied by phenomena of a preservative character,—this, if it be nothing else, would be arguing, so far as our knowledge goes, on the exception, and not the rule; and would be, at all events, referring phenomena very analogous to different laws from those to which we had traced other inflammations, merely because our ignorance did not allow us safely to refer it to the same laws: it would be preferring an assumption entirely gratuitous, to one supported at least by all the argument deducible from a striking analogy: but right is not necessarily the reverse of wrong. It would be better not to conclude any thing, than to determine that the laws must be different, solely because we could not demonstrate their identity.

So much for what might be assumed *a priori;* but I contend that the reference of common inflammations to the same general laws, is, in the highest degree, probable. It is philosophical in its primary assumption, and it is all but demonstrable on the true principles of induction; at least, I see no other mode of getting rid of the facts which I am about to mention. I beg to remind you, however, in this place, of the definition I gave you of what we call common or pure inflammations; whilst I declare to you that they are of extremely rare occurrence; and, in crowded cities, scarcely ever seen, except after injuries wherein their preservative actions are as demonstrable as the properties of a circle, or any known problem in mathematics. In wounds in a healthy person, whether made intentionally or by accident, we have examples of pure inflammation; and, in every case, with perfect success: for, as the inflammation is moderate in degree, and in as much as it is free from any of the characters accompanying the other inflammations of which I have spoken, so are repairing processes rapid and progressive; nor is this process to be regarded as a diseased superposition occasioned by the injury: it is evidently a necessary excitement, from the simple fact, that no one ever saw a part repaired without it; hence, that all parts should possess powers of repair, it is necessary that all parts should have the power of inflammation.

The ordinary powers of the part are employed in the maintenance of its structure and functions, including growth in the young subject; but to these are added the duty of repair; and, as the agenda are thus increased, the actions are increased also. If we wanted any furtherance to our conviction of this, beyond that afforded by the beautiful process of repair, without a shade of pain or an interval of interruption, we find it in this fact, that, if fearing the excitement should be excessive, and the inflammation should terminate in some other process than the one required,—I say, if fearing this,—we are too assiduous in subduing the actions of the part; we do any thing but promote the cure; we depress the necessary actions; and we retard, or altogether suspend, the necessary repair. So much then as regards the peculiar character of pure inflammation, in the purest cases we have of the process: but I say again that such cases of pure inflammation are extremely rare; there is not one inflammation in a thousand—that after injuries excepted—which does not present some obvious departure from what we define as pure inflammation, and which is not accompanied by characters which decidedly link it with one of those which are demonstrably but indications of disorder of some part or of the whole animal œconomy. Supposing, then, that such examples of pure inflammation do really occur on the surface of the body without *cognizable* disorder, or in internal parts which, from their physical characters being concealed, we cannot, from such evidence, pronounce to be of the impure kind, shall we infer, therefore, that no disorder exists? The very idea to me appears monstrous.

I need not repeat the arguments derived from the diffused inflammation of the serous membranes; and, for more practical proofs, I refer you to the section on Treatment.

With regard to inflammations, occurring in parts not visible, we have only to consider the phenomena and the circumstances under which they are developed; and we shall then be prepared to consider the laws to which they may be referred. I take it for granted that they occur in virtue of some law or other; that this is an admitted truism: wherefore the business will be, to investigate how far they fall under the laws I have mentioned, or what are the interfering influences which appear to render the phenomena which they exhibit as exceptions to such laws. A man, apparently in health, gets wet in his feet, is exposed to wet and cold, and he has inflammation of the bladder or chest. I here mention this most common precursor as regards the chest, and the most common

example of inflammation. Now here we have an inflammation affecting either the lining of the ramifications of the wind-pipe, the substance of the lungs, or the membranes which cover them. In the abdomen, we have either the mucous lining of the bowels, or the external covering, a continuation of which also lines the walls of the abdomen inflamed. I have told you before that, in general, it is one of these external surfaces which is most commonly affected; and have remarked, also, that the internal surface of these viscera is absolutely continuous with the surface of the body.

Now inflammation, we will say of the pleura, takes place; and the question is, how it has happened. Many questions occur here which may be difficult of solution; but they must be considered, if we wish to understand the real nature of the case. That the application of cold and moisture is not the sole cause is clear, because we find these agents are often applied without any such effect, and that, not only in other individuals, but in the individual who is the subject of inflammation; and yet that the application of these agents had something to do with the matter is equally indisputable, because the influence of such agents, and inflammation as *sequences* on them, are daily occurrences: and this, from the vast multitude of such cases, has become as familiarly known to mankind in general as it is to the profession.

If, therefore, the same causes have acted on the same individual on various occasions without injury, and now produce inflammation, it is clear that, if the causes be the same, the body on which they operate must be different; otherwise, effects so strikingly different would not follow.

On enquiry, in many instances, we find this difference so well marked as to be demonstrable: the existence of a difference, and the demonstration of its nature, are of course separate propositions. We find, for example, that, if any of the organs of the body be previously out of order, exposure to cold and moisture is especially dangerous, and particularly perhaps if there be any disorder of the lungs or of the digestive organs. We find also that, if the disorder involve any change of the structure of any organ, not only are cold and moisture very dangerous, but the attack will be probably in the organ so changed. Thus, if a man have disorder or disease of his lungs or liver, and catch cold, we may predict, with considerable certainty, that any inflammatory disturbance, occasioned by the cold, or arising as a *sequitur* on it, will be seated in the organ in question, or on its investing membrane.

The reason of this I have already endeavoured to explain in the book I have already referred to on the Sympathies of the Body, &c.; and that it arises from the general sympathy of all parts of the body with each other; and from that increased susceptibility in which diseased or disordered organs have to sympathize with any powerful impression made on any other organ, and with the skin, in a very remarkable degree. The same reasoning, also, goes far to explain why one organ becomes the seat of inflammatory disturbance in one case, and another organ in another, since an increased susceptibility is the thing essential; and this demonstrably depends, in many cases, on a previously disordered condition of the organ.

Nor do natural peculiarities, idiosyncrasies as they are called, materially alter the question; for it matters not how the disorder arises, as long as its existence is certain: and many individuals, who have diseased lungs, and in whom cold and moisture, applied to the skin, affect the lungs, do, nevertheless, in the absence of any such impressions, evince phenomena; shewing that, whether natural or acquired, the lungs are not in equilibrium with the other organs of the body. Therefore, it matters not, so long as there be susceptibility to disorder, whether we can, in all instances, explain the reason, as in the existence of previous disease; or whether it be so unknown as to be derived from parents, change of climate, or fall under the term idiosyncrasy. But now comes the question why the inflammation is not referred to the surface of the body, in conformity with what I have endeavoured to enunciate as the law of inflammation? In other words, what is the interference with this law? and this I think very explicable.

I have observed before, that every natural law, to be healthfully exemplified, implies the condition of natural power*: in other words, that the vital powers are not interfered with in their operations. Now it is obvious that nothing interferes with this so certainly as the system being previously disturbed. We can no more

* Any natural law may be interfered with, just as elasticity may be obscured by pressure. Digestion is a law, as regards the stomach; and it implies natural power. Muscles have certain laws; but these again imply natural power. It is a law that young animals grow; but this requires natural power, or the growth stops: and so on of every part or every process in the œconomy. Therefore it is quite consistent that any disturbance of the œconomy should disturb any law, and that in various ways; modifying it, suspending or altogether preventing its *manifestation*.

expect the human body to perform the movements which are emphatically illustrative of its perfect, because its most preservative, power, if there be disorder of some particular organ, any more than, as I have before observed, we can expect a watch to perform correctly, merely because its disorder did not entirely stop it. There is, then, a very competent explanation of the absence of a healthy development of the law which determines inflammation to the surface, in the previous disturbance of that equilibrium of function on which the manifestation of any completely healthy process essentially depends; but, besides this, another very potent cause why the inflammation should not be referred to the surface, presents itself in the facts which arise partly out of the individual condition of the particular organ attacked by inflammation, and partly from the necessary result which immediately takes place on the application of cold and moisture.

We know that the immediate effect of cold and moisture applied to the skin is reaction; that is, a glow, as it is termed: there is a resistance, in fact, to the tendency which these agents produce, to a departure of the blood from the surface; and the increased difficulty of maintaining the circulation at the surface is met by increased action of the vessels; but we know that, if the depressing influence of these agents continue, an opposite state occurs; that paleness of the skin, with the sensation of cold, supervenes; the blood actually circulates in less quantity at the surface. This blood must go somewhere, or it must be carried off by some secretion; which we know does not necessarily happen.

Now, if the body be perfectly healthy, we know that although for a time an increased quantity of blood must necessarily circulate in the interior of the body, yet that, when the depressing influence ceases, reaction takes place at the surface, and the equilibrium is restored. Two circumstances contribute obviously to this restoration to equilibrium; the one, that, the organs being healthy, the vital powers are uninterrupted in carrying out the natural tendency to reaction; and the other, that, the organs being healthy again, there is nothing to prevent that determination of blood to the interior, consequent on the depression of its circulation of blood at the surface, from being *equally* distributed, so that *each organ* has only to provide for its due share of increase; but, if there be increased excitability to disorder, and still more if there be previous disease, all this happy arrangement is reversed. Organs, either disordered in their functions, or diseased in their structure, become exceed-

ingly excitable; determinations of blood to them are at all times dangerous; and thus, while they are less able to withstand *any* sudden increase to the circulation, the excitement it produces tends to increase the quantity, and thus to aggravate the mischief.

The fault here is not in the laws of the animal œconomy, but in the previous disorder or disease which prevents these laws being carried out, by the disturbance of equilibrium. Congestion takes place in the organ; and thus the essential, primary element of inflammation occurs, and with too frequent and certain development, in a part whose vital powers are previously impaired, in which, in fact, there is practically less life. The organ inflames, and, in by far the *greater* number of cases, exhibits still the tendency of inflammatory action, by establishing it at one or other of its external surfaces. But it may be asked again, why does it not refer to the surface of the body at once, as this would be the really safe habitat for inflammation? One reason is plain, as already mentioned; because that would be an exhibition of natural power which the organ has not: besides which, the skin itself is labouring under a depression of its vital powers. It is obviously unequal to that reaction which is essential to a restoration of equilibrium: *a fortiori*, therefore, it is unequal to the still further excitement necessary to inflammation. That this would be the case, were it not for want of power to overcome the depression, seems probable, from the fact, that occasionally we actually see the restoration to equilibrium after depression by cold, accompanied by the development of inflammation in some part of the continuous surface. In considering, however, the want or absence of this power in the surface, we must not merely, in all cases, regard it as due solely to the depression occasioned by the cold; for, if any organ, from the reasons before stated, be affected, the skin then has its vital energies depressed still further by a reflected sympathy with the organ in question. Thus, shivering is not only a symptom of the depressing cause of cold, but it is *equally* a symptom of an attack of inflammation having commenced in some internal organ.

But it is a notorious fact that people are not attacked by internal inflammation who are in really good health: their previous habits or their previous condition almost universally unfolds either reasonable grounds for a belief in a disordered condition of the œconomy, or symptoms which shew it to have been demonstrably present; and this is so true as to be almost invariable. Sometimes

these refer to one organ, sometimes to several; sometimes to the organ wherein the inflammation is seated, sometimes to other organs. In fact, it is evident that inflammation is set up in a part where it is quickly destructive; and therefore, if inflammation be naturally a preservative process, there must be here some interfering influences; and we have hitherto remarked on the evidence of that interfering influence being referrible to previous disorder; but, in carbuncle, boil, gout, and other links of the chain of inflammations, we *also* deduced evidence of a local character in those manifest departures, in these diseases, from more healthy kinds of inflammation. Now, if we look at the inflammation of internal organs, and especially of that most common of them, membranous investments, we find the local characters much more allied to unhealthy inflammations than to healthy specimens of this process, as has been noticed already.

These considerations, whilst they account, on the ground of acknowledged facts, for the inflammation consequent on depressing influences on the skin taking place in or on internal organs, and whilst they explain, in various cases at least, why a particular organ is attacked, shew, like many other things described in this work, the real relation of the blood to the inflammation,—namely, that, however necessary it may be thought in certain cases, in the present state of our knowledge, to lower the actions of the whole system, in order to diminish those of the inflamed part, by thus abstracting blood from it by an influence directed to the general mass of blood, and also shew that the *general* quantity of blood is not the essential cause of the inflammation; as it has also been shewn that the effect of its abstraction is not due to the *quantity* abstracted.

This again shews the inestimable value of a consideration of the sympathies of organs in explaining diseased phenomena; for, when internal organs are disordered, and still more when they are diseased, they always affect the skin; so that it never can carry on healthy inflammation. It either refuses the power altogether of taking on this inflammation, consequent on enduring disorder of function; or else declares its inability, in either establishing in itself, or in conjunction with the subjacent cellular tissue, those departures from healthy inflammation, boil, carbuncle, erysipelas, &c.

All this points to the equalization of the circulation as the desideratum in arresting inflammation.

The actual state of our knowledge on this subject is so imper-

fect (I mean as to the mode of suddenly equalizing the circulation, so as to prevent the impairing effects of inflammation on the vital organs), that we are obliged to stop it at any rate, and by any means in our power: but that we shall, in time, arrive at the attainment of such power, is, in my opinion, by no means an unreasonable expectation. The progress will perhaps be slow, in consequence of the absence of opportunity; for, whilst we can certainly stop, in the majority of cases, inflammatory processes, we shall willingly compromise the prospective inconveniences of great depletion, in the reflection that we have preserved life, or a valuable organ, as the eye. But still the investigation may progress; and large or hasty abstractions of blood be limited to the most urgent class of cases, until advancing science shall give us the further information requisite for proceeding with confidence in treating inflammation by restoring equilibrium, and this again by attending to what are called its remote causes. In the mean time, we may avail ourselves of the following opportunities: first, where patients refuse to be bled; secondly, where we have bled as much as we dare, without subduing the inflammation; thirdly, in doubtful or masked cases; and, lastly, in cases where, though the inflammation be visible and pure, yet it is accompanied by such derangement of particular organs as to strongly suggest the idea of their producing the determination to the surface affected. I shall shew you by and by, in connection with the treatment of inflammation, that such cases afford the highest promise of increasing our knowledge, and, through it, of improving our practice.

DISCOURSE IX.

REMARKS ON ULCERS, FISTULÆ, AND TUMOURS, IN RELATION TO THE LAW ENUNCIATED; ALSO ON CERTAIN *APPARENT* EXCEPTIONS TO THE LAW, AS PRESENTED IN JOINTS, VEINS, THE EYE, ETC.

ULCERATION.

Now ulceration, or ulcerative inflammation, as it is descriptively termed by Mr. Hunter, is a glaring exhibition of a natural process, inasmuch as for one case which occurs otherwise situated, a thousand occur under circumstances where we have the advantage of *combining* observation of local processes with the functions and manifestations of the whole œconomy. As this is the case so far as the surface of the body is concerned, ulcerations afford evidently too obvious an illustration, as far as *they go*, of dispositions of inflammatory actions to the surface, to render it necessary that I should enlarge on that subject; but they also appear to me to shed a very useful and beautiful light over the real causations of inflammation and the design of Nature; or, to speak more philosophically, the laws of Nature of which they are the emanation; and it is to this that I now claim your attention.

At page 245, I have given a general description of the ordinary local phenomena of ulceration; and these we will yet consider a little more narrowly. An ulcer is not a mere abrasion of surface when it wants only the skin to cover it; it is a very different thing from that presented by a mere removal of a portion of skin from whatever part it is taken. It has, in no respect, the same characters: we know that, from whatever part of the body a piece of skin be removed, we shall find fasciæ, cellular tissue, muscles, bone, &c. as the case may be; but we cannot find, nor by any direct mode of art *at once* make, an ulcer, any more than we can make a stomach. Under all and every circumstance, however varied, there must be a secondary process,—a process emphatically set up by

Nature; and, no matter whether it be of one kind or another, it is a structure which we cannot find in the natural state of the animal œconomy. It has vessels, nerves, secretions, of a peculiar character. As regards its vessels, we know that they are extremely numerous; that they are highly delicate; that they easily bleed: as regards its absorbents, we recognize peculiar actions; and, as regards its nerves, peculiar sensibilities: it is, in fact, no matter whether its effects be reparative, destructive, or whether its appearance remain more or less unchanged, a different structure or a new structure; just as the fistula, in which a deep-seated abscess may have terminated, is a new superposition on the natural or normal condition of the body. It is certain, therefore, that it must have some function; and the question is, what is its nature* ?

Some ulcers evidently seem to have no other function but the repair of an injured part, because the process is uniformly progressive; and so soon as the part is restored, the ulcer ceases, with its functions; the part heals, and the ulcer disappears, leaving no trace of its peculiarities, and scarcely a vestige of its existence. But many ulcers do not heal, nor can be brought to this process by art; therefore, if a simple reparative ulcer will heal of itself, and another ulcer cannot be induced by any means to heal; it must either have a different function from a reparative ulcer,—there must be some interfering circumstance if its function be the same, since it cannot execute it,—or else it must have no function at all, which is an obvious absurdity.

No process of Nature can be supposed to take place without some cause, nor without some object; the propositions are in fact, truisms. The explanation of the cause would, no doubt, unfold to us the nature of diseases in general; the discovery of their objects would at least facilitate the comprehension of their individual peculiarities. If these objects were fulfilled, they would be at once

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* Mr. Aston Key has written a paper on ulceration, which will be found in the seventeenth volume of the Medico-Chirurgical Transactions, in which, if I understand this gentleman aright, he is disposed to consider ulceration as a peculiar change or "disintegration of structure" in the part occupied by it. I have too much respect for Mr. Key to dismiss any paper of his in a few paragraphs; therefore I hope to have a better opportunity of considering his views than I have at present; but I may observe that, if disintegration of structure be regarded as an occasional effect of ulceration, I do not know that it is inconsistent with any views which I entertain on the subject: if it is to be regarded as the essence of the process, that is another affair.

apparent; if they were not, the knowledge of such objects, if it did not explain the essential nature of the interference, would at least furnish us with the phenomena by which such interference or failure were accompanied.

If inflammation, then, have any reference to any condition of the animal œconomy, it is reasonable to infer, that when the inflammation ceases, the condition causing it has ceased also: and if suppuration take place, and a spontaneous discharge of matter be followed by spontaneous healing of the part, it is just as reasonable to infer that the causes which originally set up the inflammation have ceased to operate; and, on the other hand, if the suppuration continue, as is the case in ulcers and fistulous sores, that the original causes of the inflammation either continue in direct operation, or have been, somehow or other, followed by causes equally influential. The foregoing is a series of propositions, just as tenable in regard to one science as another,—just as tenable in other sciences as in medicine or surgery; because it only supposes relations of a general nature between causes and effects which do not arise out of the facts of any particular science, but to which mankind give assent with regard to all facts, and all reasoning whatever.

That the secretion of pus is caused by some disturbance, or *some peculiar condition* of the animal œconomy, has been sufficiently argued; and that it ceases spontaneously, I mean without artificial interference, is well known: and that one of the characters of ulceration is, that the secretion of pus, or some of its varieties, is continued. This must have some cause; and it will be interesting to enquire what that cause may be, whether it be in the part or in the constitution; and then to see how far the phenomena of ulceration militate against, or support, the view which I am enunciating with regard to the laws and causation of inflammation.

All writers on ulceration admit the general influence which the state of the constitution is capable of exerting in the phenomena of ulceration; and therefore I presume that the opinion of such a connection, in regard to certain cases, is admitted: it therefore only remains to shew that the connection is universal, when I think we shall have no difficulty in referring it to the common laws regulating the occurrence of inflammation. We infer that an ulcer has a function, as it appears to me, on the same grounds as we infer that any other part has a function, because we cannot conceive that it has *no* object or function.

We see, in the spleen, for example, a peculiar structure; we see an assemblage of vessels, nerves, and absorbents; we see that they are so combined as to give a peculiarity of appearance; we see the spleen undergoing various changes by disease, so that a very accurate description of one spleen, say a healthy spleen, would not be a correct description of another spleen which has been changed by disease. We know, however, nothing of the function of the spleen: we see it of varying size and situation in various animals; we know of instances even where it has been removed without material, and in some without any apparent, injury to the animal; but yet we never dream of supposing that there is not some purpose fulfilled by it in the animal œconomy.

All the essential part of the foregoing statement applies to an ulcer; and now let us consider what may be the general nature of its object or function, and especially with a view to its constitutional relations. Mr. Hunter observes, in speaking of the formation of pus, granulation, &c. p. 453, vol. iii, *op. cit.*—"What organization this may be is not in the least known; nor must we wonder at this; for it is exactly the same with every other organ of secretion, about all of which we are equally ignorant. Indeed some of the differences between one gland and another are made out, and also something of their general structure; but not in such a way as can lead us to the actions and operations of the several parts upon which the nature of the different secretions depend, so as to enable us to conclude, *a priori*, that this or that gland must secrete this or that peculiar juice."

As I have already observed, an ulcer is sometimes a mere process of repair; that is, a vacancy artificially made (we will suppose) is gradually filled by granulations, these are succeeded by the formation of skin, and the part heals, as we term it: but the constitutional relations of *this* form of ulcer are, nevertheless, very important; for if the constitution be impaired, the reparative process does not take place; and thus we learn that the simplest repair manifested in the part is really, after all, a process which implies the necessity of some accompanying condition of the animal œconomy.

Inflammation occurs in the leg, an abscess is formed, it bursts, matter is discharged, a certain district of the skin is removed, and it shews no disposition to heal. The interesting question is, why it does not heal? because the answer to that will explain its relations to the animal œconomy, and in them probably the natural mode of cure. Now that the majority of these cases, and by this I mean

the majority of all ulcerations with which we are acquainted, are to be regarded as organs, the uses of which cannot safely be dispensed with, unless we *remove with them the causes* to which their functions refer, is in the highest degree probable; and, in my opinion, demonstrable not less from reasoning than from facts which are almost equally well known to the public and the profession. These facts are the following:

In the first place, it is well known that many ulcers resist for years all attempts to heal them by local measures; secondly, in a variety of instances, the same ulcers heal very readily, either by the addition, or by the simple influence of measures directed to correct certain disordered conditions of different parts, or of the general state of the animal œconomy.

Thirdly, that, in a vast number of examples, when an ulcer is healed, it very speedily reappears after the cessation of local measures.

Fourthly, that ulcers are often preceded by well-marked disorders, which subside on the occurrence of the ulceration.

Fifthly, that, in many cases of the healing of the ulcer by local measures, the disorders which preceded the formation of the ulcer recur.

Sixthly, that, in cases where no detectable disorder preceded the formation of the ulcer, very palpable and various disorders occur on its healing, and particularly if this be the result of local measures.

Seventhly, that, on the contrary, the healing of ulcers spontaneously is not usually attended by any unfavourable results.

Eighthly, that those healing under the influence of measures directed to correct any disordered conditions, and to *maintain* a tranquil condition, are healed permanently; and that *exceptions to this result* can be satisfactorily explained from some circumstances of interference. Now, of all these facts*, every surgeon must have met with examples; and I refer them to *some* particular condition of the constitution, which condition they contribute to relieve, because, whilst the whole phenomena seem easily reconcileable with that conclusion, they appear reconcileable with *no* other. For example, a

* "In teaching 'ulceration,' I shall not rest content with the simple assertion: but I here only mention the facts in connection with the general law of inflammation; and surely they are too trite to require exemplification in a list of cases which may be seen daily almost in any public institution."

woman has ulcers in both her legs, she has been under the care of different surgeons for six years; I find that she has employed all kind of local remedies without success, until at length, wearied with unsuccessful attempts, she has given up the thing in despair, and pursues no other measure than dressing the sores with elder ointment, and taking opium, which has amounted (when I see her) to seven or eight grains daily, to relieve paroxysms of suffering.

I gradually wean her from the opium. I tell her to poultice her legs, which she had often enough done before; and I regulate her diet, and pay attention to her bowels, which had *not* been done before. I contemplate employing local remedies, in the hope that, under what I conceive to be more favourable auspices, they may succeed better; but, finding the sores amend, I postpone the exhibition of the local remedies; and, in two months, these enduring ulcerations, occupying, in the aggregate, a large share of both legs below the knee, are healed. How can I resist the conclusion that they depended on the state of her constitution? The opium had nothing to do with their origin; they existed for years before she took any opium; neither did they heal on its withdrawal. I see no mode of avoiding the conclusion which I have mentioned.

But this case, which occurred many years ago, is only one of a multitude of similar examples. Of all the other positions I have seen equally striking demonstrations; but there would be no reasonable limit to this section, were I to adduce examples of every trite fact which I mention. Some severe ulcers seem to present exceptions to the opinion which refers their maintained existence to states of the constitution; and these should be mentioned. That varicose veins give rise to ulcerations of an obstinate and intractable kind, and that whatever mode be adopted, that one very distinguishing feature in their history is their liability to recurrence, are facts well known.

The above, however, is readily explained; because, whatever has caused the varicose condition of these vessels has supplied the element of its continuance in the disorder of their mechanism to which it has given rise. The valves act imperfectly; so that, even although the circulation generally be put right, it does not follow that the original structure of the valves is restored; and thus the veins,—which had their valves deranged by being called on to support columns of blood to which they were naturally, or had become by *age*, unequal,—are, in their deranged condition, incompetent to the discharge of their *natural* functions; so that, whenever the up-

right position is restored, the ulcer will recur. That this is the explanation of such cases, seems the more probable, from the most permanent relief *(cæteris paribus)* of such cases consisting in the obliteration of the veins in which the valves exist, and in obliging the blood to return by the deep-seated ones, which have no valves —a mode of treatment first recommended by Sir E. Home, but afterwards in a more safe and judicious manner by Sir B. Brodie*. They are thus in the condition of parts organically diseased, which, wherever situated, are found not to be able to execute their natural functions: wherefore, in such cases, the correction of the condition of the whole œconomy, which gives them only their natural share of labour, still imposes on them more than, with this change of healthy structure, they are able to perform. Whilst the exceptions which varicose ulcers seem to form to the usual laws regulating the phenomena of ulceration are thus explained, no set of cases more irresistibly enforce on us the connection of their primary occurrence with disordered conditions of some part of the animal œconomy. Local circumstances and peculiar occupations, no doubt, add force to the operations of constitutional causes; and the usual depending position of the lower extremities is probably the explanation of these parts being the seat of such affections; but this does not explain the actual increase of blood in the veins; whilst there are many other conditions that do, and that very satisfactorily; whilst the examination of the cases exhibits ample evidence that these conditions refer commonly either to the liver, the heart, or the general condition of the circulation; so that you scarcely ever find a case in which evidence of disorder of one or other kind is not palpable, either as the result of age, functional disorder, or organic disease.

In a large number of examples, we see very interesting phenomena in connection with ulceration. In cases where we can most unquestionably refer ulceration to some general disturbance of the animal œconomy, we find phenomena which appear most instructive. If the health improve in such cases, the ulcer diminishes; if it retrograde, the ulcer enlarges, or there is some evidence of increase or alteration of function. Now this is just what we find in

* Sir Everard Home recommended the ligature of veins in certain cases; but this was found to be dangerous. Sir B. Brodie simply advised their division, so conducted that the opening in the vein and that of the integuments did not correspond. The advantages and the conditions they imply will be more fully discussed hereafter.

other organs which are natural structures. If the system be disordered, one or more of these organs—that is, liver, bowels, or what not—have their secretions altered, or increased, or both: and just so it is in an ulcer. But there is another very interesting fact, that, in disordered conditions, the ulcer very commonly increases; that is, its surface becomes enlarged; and the analogy of this with what appear to be natural laws is very striking.

Secreting functions have a very striking general connection with extent of surface, as we see in the alimentary canal, and indeed have reason to believe in all other secreting organs, which, so far as their structure is known, seem to consist of vessels or tubes divided to an almost inconceivable minuteness—one effect of which is evidently an enormous extent of surface.

Nor is this general connection with highly developed secreting powers confined to animals. I have observed that, in vegetables, where high development of colour is the function allotted to the corolla, there is an enormous extension of surface. I was induced to examine this point in a few flowers of highly developed colour, in consequence of the evidently villous surface presented in connection with the coxcomb, or Celosia Coccinea; and I found that other flowers, having high development of colour, though they did not present a villous surface to the naked eye, shewed one very highly so with a common magnifier. I was induced to place a particle of the leaf of a Dahlia, which I had at hand, on the field of a microscope; and it happened to be of the same colour as the coxcomb which I had examined with the naked eye; when the similarity presented by the Dahlia was so striking, that, had any one told me it had been a portion of the Celosia, I should not have suspected the deception. Now, if the ulcer be obviously connected with disordered health, and increase with that disorder and diminish with its diminution, or even if the contrary of these conditions occur (which also happens), the relations of its functions to the general health seems clear; and that its increase of surface is, in fact, an increase of function.

It follows, from this view of the subject, that ulcerations on the surface of the body become very emphatic demonstrations of the general law of inflammation; viz. a determination to the surface of actions calculated to relieve some disturbance of some part or of the whole animal œconomy; and if at present we are obliged to rest such views on rational and probable inferences from general and admitted truths, rather than on conclusions legitimately and

irresistibly drawn from established and particular, demonstrable premises, by a close chain of reasoning, it is easy to shew that the facts are not to be blamed for it; but that the fault lies in the present state of science, and that again on our mode of prosecuting it; for, as I have stated, the general connection of superficial ulcerations with the general state of the œconomy is demonstrable; in fact, it is not questioned, that I know of, by any one: but how is it possible to carry out a demonstration of the particular relations when the solution is baulked by a perpetual alteration of local remedies, with as perpetual alterations of various medicines; though the fact were as easy as it appears to some difficult, whilst the coexistence of various local and general remedies were in *combined* operation? We only arrive, in fact, at the reasonable inference, from cases where despair has dismissed the farrago of officious interferences with the processes of Nature, or where the alternation of the sore with certain states of disorder renders the relation, *quoad* that case, demonstrable: but we can multiply the demonstration at will; for I will undertake to say, that any man who will conduct half a dozen cases of ulcer in a manner hereafter to be pointed out, will easily obtain the demonstration in a form sufficiently unequivocal.

This manner supposes the maintenance of the ulcer to have reference to some part or the whole of the general œconomy; and that, if the surgeon *must* have two or three remedial measures in simultaneous operation, he will at least conduct their application with intervals; so that he may really have an opportunity of judging of the effect of one, or the inefficiency of all.

Whoever will do this, may multiply his demonstration at pleasure: but this would lead me to the treatment of ulcers, which I do not intend to discuss in this place. I am talking of the law of inflammation, as deducible from phenomena; and I will only add, in this place, that the much-neglected sores of the extremities, the most common malady presented to the surgeon, afford the most fertile field for the demonstration of the real nature of disease of any *one* with which I am acquainted. These views of ulceration, while they explain how various the sensations of ulcers may be, and how diversified their appearance, adjust the real value which is to be attributed to their local characters; namely, by leading us to associate them with the kind or degree of disorder, or with the particular organ of the functional or structural disturbance of which they are certainly the local manifestations.

It explains also how ulcers may heal very suddenly, without any, after having resisted all, local applications; or (which has often much surprised surgeons) under an application which had till then been employed without benefit, or even with injurious effects.

FISTULÆ.

I have said, in relation to the law enunciated, that one of the phenomena of ulceration is continued suppuration: and it will be necessary to consider another class of cases, in which this is the leading feature. I mean those secreting pipes in which abscesses of various descriptions sometimes terminate, and which we call fistulæ. Now, looking at the obvious phenomena of these cases, we see that an abscess, either bursting, or having been opened, as the case may be, contracts its dimensions; the sides coalesce, the suppuration ceases, and there is an end of the matter. In other cases, however, the abscess heals every where except in a particular line; it continues to secrete, and if we examine it, by slitting it open, we find that there is a pipe or tube, presenting an entirely new structure. Nature has actually made a canal: it is not merely that the abscess has partially adhered, and left a given track unrepaired, but there is a newly formed structure, lined by a smooth, secreting membrane, which is just as distinct in its nature as the urethra or any other canal, from common cellular tissue. As these fistulæ are not natural structures, it is reasonable to suppose that there is some cause for their formation. It is not that Nature does not heal the part; her conduct is not, in this case, nor in any other, merely negative; she is always doing something: but in this case she makes a secreting surface; and to suppose that she develops a new structure without reason, is not only in itself a manifest absurdity, but it is contrary to every observation of any one part of her wonderful operations. The question is, then, what is her object?—and this we shall investigate auspiciously, if we consider why these fistulæ do not heal,—in other words, why they are maintained.

Here again we must commence the consideration by the simplest cases. We at once perceive that, in many cases, the reason is very obvious. If we have a fistulous track leading to a piece of diseased or dead bone, we cannot heal such a fistula: we may slit it up or scarify it, as we please; but if we wait until the dead

bone is thrown off, then it heals without any interference whatever. Here is, indeed, determination to the surface provided for in a very elaborate manner; and fistula is the mode in which it is performed.

Urinary fistulæ are also very instructive. Irritation is set up in the urethra, which becomes thickened at some part; this of course narrows the canal, and consequently affords a growing obstruction to the ejection of the urine. As the causes which produce this irritation and thickening are allowed to continue in operation and are probably in most instances factitious, Nature has no chance of removing such thickening and clearing the obstruction. She therefore, as she cannot preserve the ordinary calibre of the pipe through which the water is to flow, increases the power of the engine (in this case, the bladder), which becomes actually increased in its muscular mechanism. Even this, however, is not sufficient; for the canal gradually becomes so contracted as to be not only exceedingly small, but occasionally to be obliterated; so that the passage of the urine through the natural conduit, becoming at all times very difficult, at last may be impossible. Now, then, Nature opens a passage by ulceration: sometimes she includes the strictured part in such ulceration, and makes an aperture where of course it can only be of use,—namely, behind the stricture,—that is, near the vessel which is to be emptied. In doing this she has provided, it is true, against an accident; which, unless met by art, necessarily proves fatal,—that is, retention of urine in the bladder;—and, therefore, the act is really preservative.

Still, although safe as compared to the retention of the urine, it is a very serious occurrence The urine, flowing through the aperture thus made, is brought into structures with which this acrid fluid is not naturally in contact. The urine is essentially an excrementitious fluid; almost any thing can be retained more safely than it. Coming, therefore, into contact with parts not endowed with the requisite functions, it must be got rid of; and, as the absorbents are apt to take up matters in many cases, even when such matters are injurious, it must be brought to the surface very quickly. It is the property of urine, and apparently for a good reason, to excite violent inflammation in parts not naturally destined to be in contact with it; and its transmission to the surface (the inflammation being so violent) is very rapid. The surgery of these cases consists in expediting the process by deep and free incisions, so as to evacuate the urine by a direct opening, which

Nature, even in this rapid development of her process, cannot easily do, but by means of an extensive inflammation.

The urine, however, once brought to the surface, Nature immediately sets to work to provide against the continuance of this disturbance. She makes canals or fistulæ, through which the urine can flow without danger, and establishes in them a surface, imitative, if I may so say, of the natural canal. These fistulæ continue, forming so many canals, endowed with a suppurative secretion, and allowing free exit to the urine. Now, various attempts have been made, in former times, to slit up such fistulæ; but, unless the division included the contracted portion of the natural canal, or that were previously put right, they were of no avail. Now, we restore the natural canal, and learn the real cause of the continuance of the fistulæ, in their immediately beginning to heal without any other operation; and thus these cases are as tractable as they appear formerly to have been otherwise. Nor is that explanation correct which refers the cure of the fistulæ to the urine flowing (as the natural canal is restored) where it meets with the least resistance; for it would be difficult to shew that the various fistulous tracks offer less resistance than the urethra; for it is by no means an essential condition that the canal be restored to its natural calibre before the urine ceases to flow by the fistulous track. All which will be more fully shewn, of course, when the diseases of these important organs are discussed.

Fistulæ occur also, as is well known, about the rectum; and very interesting things they are, as presenting exactly a similar state of things, but so modified as to form a link between those fistulæ the causes of which are readily perceptible, and those wherein the causes are obscure or unknown. Cases of fistula in ano present examples both of one and the other; with this addition, however, that for one in which we cannot trace the cause to some condition of the whole, or some important organ, of the animal œconomy, a vast number occur in which the connection is easy and palpable; so much so, that it matters little whether we select our evidence of this connection from the history, progress, or treatment of the case, or from one which has been unsuccessfully treated, or otherwise. I have operated on as many fistulæ, probably, as most people of my standing. No cases in large institutions are more common than those in which this operation is supposed to be required; and therefore I speak with the confidence

of experience, when I say that no fistula is ever formed by the side of the rectum without obvious disorder of the general health; nor, indeed, without the situation of the disturbance being easily traceable to some particular organ.

The connection between these affections and disorders of the chest is well known and easily intelligible; but the fact is all I need mention now. The relief which usually follows the inflammation and abscess, of which the fistula is the termination, is also well known. It is equally well understood not to be permanent, if the causes of disturbance are allowed to continue in operation. Moreover it is certain that the division of fistulæ is frequently unsuccessful; and I have frequently operated on those which had been unsuccessfully operated on before. This is usually attributed to the operation not having been properly performed, or the dressings carefully applied; both of which may perhaps be the case on some occasions: but the more frequent cause is, that, neither before nor after the operation, is the requisite attention paid to the removal of the circumstances on which the disease depended, or the prevention of their recurrence. When this is done, fistulæ do not recur; and of this fact I am so certain, that if I knew a patient's habits, I would venture to predict with certainty whether his complaint would return, unless indeed he had some other malady substituted for it.

The relief of these cases shews in other ways their connection with the general œconomy, and proves, often enough, that the relief ascribed to the operation is in fact due to other causes. A patient is about to be operated on for fistula; the discharge is considerable, he suffers great pain, and so on: he is desired to keep quiet, poultice the part, to live low, to abstain from fermented liquors; his bowels are well evacuated, they are kept regular; and, especially before the operation, means are taken to ensure the complete evacuation of the alimentary canal. Now all these things, which are undertaken as conditions favourable for the success of the operation proposed, are really those which strike at the causes of the malady: but the operation is performed, the part heals, the patient gets about, the surgeon takes his leave, and the patient has been successfully operated on for fistula. Granted. But we find that, in most cases, all the troublesome symptoms have subsided before the operation. The amendment of the health has relieved the pain and inflammation,—nay, it has lessened the discharge. To the latter, then, which indeed is troublesome and

loathsome enough, the symptoms are confined; the operation, however, is performed, and the cure ascribed to it.

At one time I began asking myself why, under such circumstances, I operated at all; and I ended in operating, truly, in some cases still,—but for a very different reason from necessity; and that was, to relieve the patient speedily from what he thought a great inconvenience. For the cases in which patients refused to submit, when the pain was removed, and those in which further experience induced me to leave the operation as a matter of option, shewed that the fistula either disappeared altogether, or dwindled to a very small sinus, with scarcely a drop of matter; or else, if some suppuration continued, ceased to give any trouble.

But any of these patients would soon become annoyed if they were incautious of their general health; and many of them know very well the particular errors which reproduce the local disturbance: as errors in diet, for example; or neglect of the bowels. In short, what I mean to say, generally, is this,—that, whether we regard those abscesses near the rectum which do not terminate in fistula, or those which do, they are always demonstrably connected with some disorder of the general œconomy; and that not only the general disorder, but its particular seat, is for the most part demonstrable. Another fact, too, in regard to fistulæ in this part, is, that the inflammation preceding them has all the characters which link it, in kind, with those inflammations in which disturbance of the general œconomy is most clear and most universally admitted—I mean with erysipelas and boil. The action is violent; the colour deep red; the pain excessive; the discharge highly offensive and peculiar; and there is almost always more or less sloughing of the cellular tissue, or skin, or both. Here then we have, in fistulæ, a new organ, in which a suppurative process is established at the surface, in obvious relation to some condition of a part or of the whole of the animal œconomy, just as we have in ulceration: which shews that both one and the other really consist of processes established at the surface for the relief of the system; and that these processes are established by the agency of inflammation.

TUMOURS.

Tumours are a dissimilar family of diseases, which, regarded in connection with the preceding views, are susceptible of great sim-

plification. Whatever has been said of the general connections of ulcers, is equally true of tumours. These bodies must have functions of some sort; they are, for the most part, organized; and, where they appear most evidently not so, their *contents* may, with a certain degree of probability, be regarded as having no function. They are like foreign bodies, which remain in the body, surrounded by a cyst; but, again, as this cyst has a function, the pervading simplicity of the law under which they become manifestations of disturbance, referred to the surface of the body, becomes equally apparent. I am prepared to shew how these laws are borne out by the practice to which they lead, and its success in obtaining the removal of the growths by natural processes; which, although very different in different cases, yet is the same, in principle, in all; namely, that which refers the tumour to some condition of a particular organ, or of the whole animal œconomy: in general, to both in conjunction. I regret very much that I cannot enumerate all the propositions, nor follow up the enumeration by all the facts, bearing on this point: there are, nevertheless, certain considerations with respect to tumours on which I cannot avoid adding a few words.

Tumours are not usually considered as resulting from inflammation proper; but their existence must be derived from the essential character of all inflammations; namely, increased action. Mr. Hunter very truly observes, of "lymph, as the product of ordinary inflammation, that this mode of separation of coagulable lymph is not confined to this species of inflammation; it is separated, on many other occasions, to form tumours," where inflammation does not seem to be the leading character. Now this is essentially a correct view; it is only incorrect in gratuitously supposing that the substance, coagulable lymph, is the pabulum for the formation of tumours; which, whether true or not, does not necessarily interfere with the law to which they may owe their formation. This subject, like many others, throws more or less light on the real law of inflammation; but this process can never be fully discussed until its various modifications be considered, which cannot be done except by the consideration of many other diseases. Yet a few remarks may be mentioned here.

Where that increased deposition, which forms what we call tumours, takes place once elsewhere, we find that it takes place in an incalculable frequency in the cellular tissue near the surface; the usual seat of inflammation, in a *primary* sense,—more so indeed

(except it be in very small districts) than the skin. For, although inflammations appear on the surface so frequently, yet most of those which are extensive are not seated primarily in the skin, nor do they usually destroy more of this than is sufficient for the discharge of the products of inflammation. We see a good reason for this, in that the skin is a much more important structure than cellular tissue; its function one much more indispensable; and we gather this from its physiology direct, as well as from its pathology. Extensive inflammation of the skin is always a serious affair, as we have seen in the extension of erysipelas to it, and as we shall presently observe in burns.

Increased deposition is clearly a preservative process in Nature; and it occurs under a variety of different circumstances. If the body be overnourished, the simplest remedy we know of is the deposition of fat; but we have plenty of evidence that fat subjects are not the most healthy. This fat, too, is generally deposited where it produces least inconvenience at first; but the extension of this process leads to inconvenience. Even then we seldom find it deposited first in any situation where it destroys function. We have it sometimes in a distinct site; and this is an adipose or fatty tumour. But, as hypernutrition is neither the only, nor perhaps the most general, disorder which accompanies the formation of tumours, so we have a multitudinous family of these diseases, exhibiting every conceivable variety, so far as their physical characters are concerned. Sometimes they are bony, cartilaginous, horny, or intermixtures of these; sometimes they are like certain natural parts, as the mammary gland and sweetbread; sometimes gelatinous; sometimes firm and fibrous; sometimes a texture, like an intermixture of fat and gland; sometimes cellular; sometimes like firm suet; and consist of those various products which had led to the terms atheromatous, steatomatous, and melicerous tumours. Mr. Abernethy made a sort of classification, founded on their obvious appearances, in connection with certain constitutional peculiarities, as shewing them to be of benign or malignant character. This is evidently the right road; but the generalization is inadequate to practical purposes. What we want, if their physical, or even their chemical, characters (a point to which lately more attention has been excited) are to help us to their treatment, is not the mere general fact whether they are curable or otherwise in the present state of our knowledge, but the particular state of various functions, in different classes, and in individual cases. We want,

in fact, the *extension* of Mr. Abernethy's plan; for, although I would be the last person to undervalue the chemical investigations of these tissues,—yet, as the disorder of the animal œconomy which accompanies them must be the real desideratum, perhaps it is not too much, when we consider the very limited application of mere chemical reasoning in respect to life, to expect quite as much from their physical characters, as marking this connection, as from their chemical composition. Both modes of enquiry, however, are evidently not incompatible with each other, and should be both pursued.

A great deal of light is thrown on this subject by the effect of operations; and a great deal of false reasoning, in regard to them, requires correction, as I hope to shew when I come to consider this class of maladies. At present, nothing is more certain than that the removal of the tumour does by no means remove the cause of its production; and, in many cases, the manifestation of the fact is the actual reproduction of the tumour. And I apprehend I can shew, also, in due time, that tumours may be removed by the *same powers* that produced them, namely, the *powers of life;* which, producing them when disordered, remove them on being restored to their natural condition.

The limits of this volume oblige me to postpone the consideration of the law of inflammation, as exemplified in different diseases, until an opportunity occurs for treating of these diseases in a full and proper manner. There are a few subjects, however, on which I will at once offer an observation or two; which, by their nature or frequency, are likely to suggest themselves as exceptions to the law which determines inflammatory actions to the surface: and, first, we will offer a few remarks on affections of

JOINTS.

Now here, as in other cases, if we wish to understand the real nature of any one class of cases, we must trace the various other affections with which they are linked, and begin by collecting all facts in relation to the subject concerning which we enquire; but, as a great deal has already been done in this way in the preceding pages, we may at once proceed to put the reasoning and the facts together, so far as affections of joints are concerned.

We cannot say that joints are, strictly speaking, the surface of

the body, though many of them, and those most frequently affected, are contiguous to it: we cannot say that they are parts unimportant; nor that inflammation of them is otherwise than a serious occurrence. Let us, then, consider briefly the circumstances under which they become inflamed; and what objections they really afford to the generalization, in regard to inflammation, which I have proposed.

Now, what do those very common affections of joints teach us, which occur in connection with gout, rheumatism, or scrofula? Why, in gout and rheumatism, we see, first, inflammation notoriously accompanied by disorder of the system, which disorder, it very frequently, and at first very generally, relieves. We see the pain, &c. referred to the joint; but the inflammatory actions are transferred to the surface, and the cellular structures beneath it, so that the structure of a joint is seldom impaired by these diseases, —that is, gout or rheumatism,—until it has been repeatedly attacked by them. To this, as affecting natural power, it may be added,—that, at first, the causes of these diseases are generally of a removable nature. The disorder of the system is usually brought on by improper living, or exposure to cold, the body being previously in a disordered state.

These are causes which are obviously struck at by regulation of diet and temperature, and those secretions or excretions which may be impaired,—which is the common treatment of gout; and the consequence is, as I have already observed, that it is only after the repeated or sustained operation of the causes of gout, that the structure of joints becomes organically impaired. The perfect manner in which parts thus recover, after gout, forcibly struck Mr. Hunter. But, besides the foregoing, it should be remembered, that, in gout, many circumstances contribute to leave Nature unmolested in her operations. Both gout and rheumatism are extremely painful; they neither of them require, from the medical attendant, any injunction as to rest of the part; they both prohibit motion by the pain which accompanies it. They are both commonly attended by impaired appetite (another very curative circumstance); or, if appetite be present, the indulgence of it is so rapidly followed by exacerbation of symptoms, as to prevent the repetition of such indulgence. The patient, in this case, bears about him the best of all physicians, Nature herself, who speaks so intelligibly that she cannot be mistaken; and the consequences are, as stated, that the injury to the joint is trivial, until the repe-

tition of the causes has induced repeated recurrences of the disease: and surely it is not necessary to insist, that repeated attacks of gout or rheumatism impair the powers of the body.

Now what I have stated, as so happy (although so painful in some of its features) an arrangement in gout and rheumatism, does not apply to scrofula. Here, in fact, many of the circumstances are reversed.

The approach of scrofula is not ushered in by pain; the disease is insidious, and creeps on with a kind of stealthy, and too often in other parts with a kind of fatal, silence. The pain is very little; the patients are generally young; at the time when, of all others (if we are to talk of cure of the joint), rest is most essential; neither do the suggestions of Nature oblige, nor does the medical attendant enjoin, much less compulsorily ensure, that *absolute* quietude, which is the very alpha and omega of the treatment of joints, and of all parts (whose vital powers are of a low order) when labouring under excitement.

Digressing for a moment: I can in no way understand the frequent neglect of ensuring the quiet of diseased joints by splints, after what Mr. Abernethy taught for so many years on this subject, and which Sir B. Brodie more recently recommended. I never mention this subject without feelings of annoyance. I say, again and again, that I am certain I have saved more limbs from amputation by ensuring absolute rest of diseased joints, than by any single measure whatever. To return:—I cannot here say all that must, in due time, be stated in connection with scrofula: but we know that the causes of this disease are much less within our power than those of gout, or even rheumatism. This, perhaps, is partly because they are less perfectly understood, and partly from our climate being so obnoxious to scrofula, that it very much increases the difficulty of availing ourselves to the full extent of what we really do know. Besides this, as I hope hereafter to shew, scrofulous cases are often exasperated by many of the measures which are instituted with a view to relieve them. Then, again, joints are by no means the most frequent seats of scrofula. In an immense majority of cases, the subcutaneous glands, and the skin covering them, are the parts first attacked; and this, in a vast number of cases, wherein the joints do ultimately become the seat of disease,—where, indeed, though the disease be serious, it is less so than in other structures which appear especially obnoxious to this malady,—I mean the lungs and mesentery.

We must not, however, measure, as natural processes, the va-

rious terminations of scrofulous affections of joints by the absolute number of cases in which either the joint is destroyed, the limb amputated, or even life extinguished, as they are (speaking of the mass) at present treated,—of which, more hereafter.

Scrofula in the lungs, or even in the mesentery, is often, in fact perhaps generally, sooner or later fatal. In joints, *properly treated*, it is scarcely ever destructive of life, or, as I hope hereafter to shew, of the limb either; so that, in point of real importance, diseases of joints are far removed from similar affections of the lungs or mesentery. In scrofulous affections of joints, however, it is interesting to observe, that notwithstanding that the part most liable to the disease is the bone, yet we almost always see some attempt to determine to the surface in the swelling around the joint, and in the effusion into the cellular tissue; whilst, at more advanced stages, these appearances are changed: ulceration giving discharge to matter or other products, the results of the scrofulous inflammation. We also see in scrofula what is very material to the argument,—a most striking want of power, as contrasted with gout; for whilst in gout the constitution will resist, for a long time, the influence of natural causes, strengthened by all sorts of artificial excesses, we cannot ensure in scrofula even resistance to the natural vicissitudes of the climate in which the patient is born. I will only here add, that the most frequent and the most harmless exhibitions of scrofula are at or near the surface in the superficial glands, and the skin covering them: that the next in order of safety, and perhaps frequency also, are the affections of the joints; and that these are as much preservative, in relation to disease of the lungs or mesentery, as affections of the superficial glands and skin are when contrasted with scrofulous affections of joints themselves.

Reasoning then from these affections, in which disordered states of system, and their connection with inflammation of joints, still offer either successful determinations to the surface, or afford types of, or attempts at them, with insufficient power, we come to a class of cases in which the inflammation is less characteristic, more pure, as we phrase it, but which still exhibit a powerful determination of diseased action to the surface, and with perfect success as regards the safety of the joint: and be it remarked, notwithstanding the various injurious influences operating to the prejudice of natural power, that even in a large city they are, beyond all calculation, more frequent than common inflammation affecting the proper structure of joints.

Every surgeon knows the following description of cure. A

patient has pain and swelling in the vicinity of a joint; he is disturbed, and the pain on motion compels the observance of rest; the swelling increases; it either points, or some district may afford more palpably the sensation of fluctuation, or, before pointing takes place, the fluctuation is unequivocal.

The question occurs, in some cases of difficult and in others of easy solution,—whether the matter communicates with the cavity of the joint? and the decision that it is exterior (more or less confident in different cases), determines the surgeon to evacuate the fluid: this is discharged, the measures are continued, and the patient speedily recovers. These cases are common enough. Here is a good example of them:

William Payne, aged thirty-three, says that he has been confined some days to his bed, with pain and inability to move his right knee; he is a journeyman coachmaker. The pain came on *suddenly;* at first it was very slight, but in about twelve hours it had increased so much that he dared not move the joint. He reports himself temperate, and can attribute his complaint to nothing; nor is he aware that he has caught cold. He dined on pork the three days previous to his attack, and is usually gross in his habits, living very much on the last-mentioned meat and sausages. His bowels act daily; but the discharges are dark or black, and very offensive. He is ordered to poultice the knee, and to take some calomel, with an aperient: if his bowels act freely by the morning, and he is then no better, he is desired to put on twenty leeches to the knee. The knee is swollen, elastic, and tender; but he refers the pain more in the direction of the back part of the joint, towards the ham. Next day the bowels acted freely; leeches were applied, which bled freely; but he is still no better; knee much the same; but inflammation is more unequivocal near the surface. Two days after this he is rather better; bowels still open, and the evacuations of a brownish and more natural appearance. Inflammation, which was extending up the limb, has become less. He can even now bend the joint very slightly without pain; there seems to be fluctuation, and this, on attentive examination, seems to extend over the right side of the joint, some distance above and below it. I made an incision below the joint, and evacuated a large quantity of well-formed pus; finding that the whole district of the fluctuation communicated as I had anticipated. The symptoms now rapidly subsided.

Another very numerous class of cases, exhibiting the preserva-

tive tendency constantly prevailing with regard to the seat of inflammation, is seen in those cases in which the inflammatory disturbance is referred to the synovial membrane lining the joint. I do not here include those changes of structure of the part, as thickening, deposition of lymph, &c., concerning which Sir Benjamin Brodie has written; but those where disturbance ends in effusion into the joint, either of its natural secretion (synovia), or more generally, perhaps, one of a more aqueous or less slippery quality. Whether these, or the cases I have just mentioned, stand first in the order of frequency, it is difficult, from individual experience, however large, to determine: but that both of them take precedence, in point of frequency, of other more serious affections, is incontestible. Now, here again we see a determination doing least harm to a part; and, as in the determination to the surface, we see another thing, and this a very essential one, which they possess in common,—viz. that the inflammation is determined to a part with higher powers of life; that is, in fact, to say, with the greatest power of resisting inflammatory action with impunity.

Now a vast number of these cases occur in practice; and the only rational explanation of those first mentioned, afforded by their history, their symptoms, their progress, and their termination, is, that irritation, commencing in the joint, has been referred to the surface, where it has terminated in suppuration; but, when we have subtracted those very numerous examples of affections of joints afforded by gout, rheumatism, scrofula, and the purer kinds of inflammation which are determined to the surface, as in the cases to which I have just referred, undoubtedly there yet remain many cases of inflammation of joints which cannot be regarded as falling under either of the kinds of disease which I have mentioned; nor can it be concealed that, in many of these cases, the diseases do, in different instances, practically lead to disorganization of the joints, or, by affecting the health, to the amputation of the limb, and under circumstances which induce us to do this from the conviction that the amputation is necessary to the safety of the individual. But let us see how far these cases are really exceptions to the laws I have mentioned.

In the first place, the determination of diseased actions to the surface supposes, like every other preservative action of nature, a certain degree and a certain balance of power; and, if this be not present, neither this law, nor indeed any other, can be perfectly accomplished. It is no more sound to argue that it is not a law in

the animal œconomy to determine diseased actions to the surface, *merely* because they are not invariably placed there, than it would be to infer from indigestion that the primary process of assimilation is not the natural function of the stomach.

If we can see an exemplification of this law or tendency in a thousand cases for one where we find an apparent exception,—to say therefore that the law does not exist, would be to argue from our ignorance rather than from our knowledge,—from the exceptions rather than from the rule. Now Mr. Hunter and Mr. Abernethy observed that, in disturbances of the constitution, parts were most likely to suffer which had least powers of life, or most susceptibility. The latter term is not very tangible as a ground for argument; but the former furnishes us with an idea on which we can agree as to the meaning. Now, although our notions of parts having little powers of life, like most other notions in medical science, are mixed up with something of error (or at least of assumption, which is gratuitous)—such as that these diminished powers result from the part being less sensitive, or less vascular*, as we term it—yet we can safely assert that certain parts of the body do most un-

* The assumption is gratuitous, as regards comparative vascularity as the cause. We assume this, merely because we cannot demonstrate the vessels; and this in the face of facts which convince us that thousands of animals, perfectly organized, exist, of which our external senses do not enable us to take cognizance, nor even the microscope to examine. Then again the fact of few vessels being visible by no means necessarily implies imperfect power. The cornea of the eye, in its healthy condition, is emphatically a part in which we can ordinarily discover no vessels, and it is very insensible; yet I am not aware that I should be right in stating its power of life to be very subdued, even though that manifestation of vessels which it affords in inflammation were absent. We see the cornea support all those changes in disease which any other parts support; the most unequivocal illustration of which is ulceration, because here we are sure that the actual substance of the membrane is the part affected; in other words, that the affection does not reside in that modified continuation of the conjunctiva in front, nor of the membrane of the aqueous humour behind. There is a striking beauty in this power of the cornea; for, were it endued with as little power as joints, it would be surrounded with destructive agencies, in consequence of its relations with parts having great powers of life combined with great exposure to disease, to which the destructive element of motion would be added; so that we might reasonably infer, were its vital powers less, that disorder of the eye, in which the cornea is involved, and which now proceed so manageably as even to justify, under good treatment, the term trivial, would have been destructive of vision. There is indeed a great deal of exquisite beauty perceptible in the whole arrangement of the relations of this membrane: but I must speak of this hereafter.

questionably shew a greater disposition to perish under diseased action than some others; and, as nothing can be preserved under diseased actions by any other means than vital processes, so we naturally conclude that the vital powers of the parts in question are less than those of many other structures: such parts are bones, cartilage, ligament; in fact, the structures of joints: and the phenomena of gout, rheumatism, together with affections arising from changes of temperature and many other causes, shew how readily, under an infinite variety of disordered conditions of the system, these structures become the seat of its local manifestation. These facts seem to me, therefore, rather to establish the law of inflammation being a tendency to determine actions to the surface, in explaining those circumstances which, as interfering with its operations, appear, at first sight, to constitute exceptions; for it cannot be too often repeated, that the clear development of any natural law in the animal œconomy depends on the presence of natural power; nor can the fact be too strongly impressed, that, in the cases where joints are attacked, they are often less important parts than those in which corresponding states of disorder are manifested where no affections of the joint occur. Thus, the same state of constitution, which, in one case of gout and rheumatism, produces affections of joints, will, where there is no affection of those parts, produce affections, much more dangerous, of the stomach, heart, and brain; and, as has been already remarked, when scrofula does not manifest itself in joints or near the surface, it too often affects the lungs and mesentery. It is therefore, after all, productive of results in themselves preservative, in that joints, or the structures of which they are composed, are thus placed under laws which appear to render them as insusceptible, under moderate degrees of disturbance, as they are susceptible, on the contrary, when the disturbance of the œconomy becomes more fully developed; since the bringing of them thus within the reach of that degree of disorder which experience shews to be sufficient to develop disease in parts essential to life, renders these affections, as regards such vital parts as the brain, lungs, &c. a habitation for disease, just as really preservative as skin and cellular tissue are when considered in regard to joints.

Finally, I would observe, as a matter of experience, to be more fully substantiated by facts, in their proper place, that affections of the internal or essential structures of joints (accidents or mecha-

nical injuries excepted) do never occur but in connection with very visible disorder of the system of some kind or other; so that, whether the presence of such disorder be admitted or not as a competent explanation (in the impairment of power implied) of the departure from what I regard as the natural manifestation of the law of inflammation, whenever it arises independently of accident, the fact of the coexistence of such disorder is indisputable.

Now we observe certain affections of the

EYE,

which, if we admit that they are inflammatory, seem to offer, at first sight, exceptions to the law I propose in regard to inflammation.

I have already observed that an incalculable majority of the diseases of the eye occur on the surface of the organ (or the conjunctiva); and I have added that the most frequent cases are those in which the operation of internal causes is most manifest, as in scrofulous ophthalmia. It may be further observed that, when the proper tunics of the eye are affected, the external ones are by far most commonly the seat of inflammation; the sclerotica, for example, as compared to the choroid coat, regarded as occurring without the operation of excitement or injurious influence directly applied to it from without, as is so commonly the case when a deeper-seated part than the retina becomes affected.

Now we have in the eye a transparent part behind the pupil, called the lens; and this is contained in a little bag or capsule: the opacity of one or both of these parts constitutes what we call cataract; and we add the term capsular, lenticular, or capsulo-lenticular, as one or other or both of these parts are affected respectively. It might be mooted as a question (had I any object in so doing), whether this cataract be inflammation at all; but, as my object is truth, and not to carry on argument merely, I shall not hesitate to admit that this opacity does take place from a process not essentially different from inflammation; since the cases shew that the existence of excitement is extremely probable, whilst the changes are purely of that character which we know inflammation (when more obviously developed) to produce in transparent structures—viz. opacity—added to which, in many cases where no obvious excitement has existed, we have the capsule adherent to the iris in front of it; in many of which cases I have myself ope-

rated. We also find that, when the lens or its capsule is mechanically injured, the result is opacity*.

In regard to cataract, there are two circumstances very interesting; viz. that, in all cases, we observe facts which can be explained only on the supposition of excitement acting directly from without on the lens, or transferred to it from within, as a part nearer the surface, from an organ (the retina) affections of which are far more serious and irreparable than are any of the diseases of the lens. With regard to the excitement from without, the function of the lens is the transmission of the rays of light; and there is no reason for doubting that excessive stimulation by light of great intensity, or for unusual periods, may prove *directly* exciting to this body, just as any excess of function may prove injuriously exciting to any other part; and it is interesting to observe that the opacity draws a blind, as it were, between the exciting cause. But a more important consideration, and one apparently more directly connected with the cause of cataract, is found in the following considerations, which evince alike that its occurrence is a determination to the surface, and is *(quoad* the more important part, the retina) preservative. All causes of cataract, mechanical injuries apart, involve high excitement of the retina. We feel demonstrably the excitement of vivid light; we feel the fatigue consequent on the continued excitement of distinct vision; we know how much this is increased, and how much sooner it occurs, if it involve the examination of minute or glistening objects; we recognize the effect of a country covered with snow in the excitement it occasions, in the same manner. Now we find practically that the best-ascertained causes of cataract involve all the circumstances here mentioned. Thus, we find that persons most obnoxious to cataract are, *cæteris paribus*, such persons as watchmakers, those who are engaged in the construction of mathematical instruments, shoemakers also, in short, all those whose occupations require the constant exercise of distinct vision on objects which are minute or glistening, or both, and which occupation combines also, in greater or less degree, a position of the head favouring congestion of the eye. All these functions refer with especial force to the retina; yet we do not see the inflammatory or diseased changes

* This does not appear a necessary result in animals, when the capsule only has been intentionally wounded.—See Archives Générales de Médecine, October 1826.

set up in this structure, but in the lens exterior to it; and this in so large a majority of cases as to be of difficult calculation; for, whilst cataract is a common occurrence from such causes, inflammation of the retina may be regarded as extremely rare. To shew that I do not speak without some experience in such matters, I may observe, in regard to the frequency of cataract, that, in the first ten months that I held the appointment of Surgeon to the Dispensary, which only relieves diseases of the eye in common with other maladies, I performed about twenty operations for cataract only. It appears from the foregoing, that, if we are to regard the changes in cataract as not essentially different from those resulting from inflammatory actions, they are to be regarded not only not as exceptions to attempts to determine to the surface, but, on the contrary, as capital examples of it, under circumstances which, *a priori*, we could not have expected.

A variety of other considerations in regard to the eye throw much light on this subject; but I am not anxious to multiply illustrations; since, if this work is to be continued, diseases of the eye will be necessarily considered as a distinct subject; and then, I trust, I shall be able to shew how beautifully they and other affections of the system mutually illustrate each other. I would rather not here increase illustrations calculated to hurry the reader to conclusions which I shall value only as the result of reflection and enquiry.

A great deal of interesting matter arises from certain changes which appear incidental to age; but these I postpone also to the time and place more proper for their consideration: I will only observe, that that change of the cornea which we call the arcus senilis, and which consists of a more or less complete zone of opacity around the circumference of the membrane, is placed where it interferes least with vision, so indeed as not materially to impair it; that is, in fact, in a part of the membrane farthest removed from the pupil through which the rays of light are transmitted.

The next subject on which I must also, at present, be content with a few observations, is inflammation of

VEINS.

I had intended, in considering the example which phlebitis affords of inflammation of internal parts, occurring both from injuries, in the ordinary sense of the term, and also without *such*

injuries—I had intended, I say, to reason up to this question, though a much more frequent and marked example of an analogous circumstance, which occurs so often in connection with strangulated hernia; but I found the section so long, that I have been, in my anxiety not to increase the size of this book unnecessarily, induced, somewhat reluctantly, to postpone the argument it affords, with many others, in favour of the law which it is my object to enunciate. Inflammation of veins, like all other inflammatory affections, may occur as a sequence to local injury, or without any exciting cause being perceptible; the latter, however, is comparatively a very rare occurrence, and explicable on the ground already considered. The more common examples in inflammation occur as a sequence on parturition, or the wound of a vein, as inflicted in the ordinary mode of blood-letting. It matters little what class of cases I select for observation, as the remarks, with greater or less force, apply to both.

As inflammation of these vessels after venæsection, if it be not the most frequent, is perhaps the more familiar occurrence, it will perhaps best serve the purpose. Those who wish to see what happens after parturition, either in regard to the veins of the uterus, or in those more familiarly known to be affected in the local manifestation of what is termed phlegmasia dolens, will do well to consult Dr. Robert Lee's paper, in the Medico-chirurgical Transactions, on that subject.

Now inflammation of veins in the arm presents us with the following facts:

Undisputed inflammation of the interior of the vessel, as a sequence on the wound of venæsection.

A rarity in occurrence, which, regarded in proportion to the infliction of the wound (bleeding), is absolutely incalculable.

The institution of this wound, for purposes and under circumstances which, of themselves, imply disorder of the animal œconomy, and which is accompanied by measures obviously tending (as bleeding) to diminish power.

The failure of that extent of adhesion, which, if it do not itself limit it, is practically found to coexist in all cases of the limitation of membranous inflammation to the part wounded. The inflammation is, in fact, extended ("diffused").

The argument, therefore, that this apparent departure from the law results from previous disorder of the œconomy, as designated in the term absence of natural power, is grounded primarily on

the extreme rarity of the occurrence, as compared with injuries to veins, and the coexisting evidence of disorder implied in the purpose for which the bleeding is instituted.

Both these arguments derive support (in relation to some peculiar disorder of the œconomy being the essential circumstance) from the following facts:

That wounds in veins, in bleeding, are only, after all, a few of the occasions on which these vessels are injured.

That, in the majority of cases, the local conditions following the wound in venæsection are of a nature calculated to disturb healthy processes. I refer especially to the careless manner in which the wound is generally treated, and the neglect on the part of the patient to observe that abstinence from motion which is at all times contributory to the well-doing of wounds which are to unite by adhesion; and yet that the inflammation in question is, as I have above stated, rare.

More positive evidence, however, of absence of power, in many of these cases, is seen in accompanying disease of the viscera; and again of attempts to carry out the law of inflammation from the dissection of such cases; so large a number of which prove fatal. Effusions into the cellular tissue of the affected limb, abscesses in the joints, or in various situations,—some of these being in the vicinity of the vein, others remote from it,—effusions in the chest or other parts, resulting from actions set up by the serous membranes,—have been singly, or in greater or less combination, present in almost every case—occurrences which, dangerous as they are, may be regarded as something more possible of recovery than continued extension of venous inflammation; just as abscesses of the liver or other parts, from injuries of the head*, may, through internal inflammations, present better chances of recovery than abscesses in the brain; there being cases of recovery of the former, none of the latter.

You will perceive, also, that the same kind of argument applies in relation to the wound, and the inflammation of veins, considered as cause and effect, which I have mentioned in relation to erysipelas, tetanus, and other affections. But the argument in support of the law, derivable from inflammation of the veins, can be only fully understood when these affections are more fully considered; and when the facts put forth in the writings of Hunter, Abernethy,

* Portal, Mem. de l'Academie de Chirurgie.—Cheston's Pathological Enquiries.—Larrey, Mem. de Chirurgie Milit.

Travers, Hodgson, Arnott, Carmichael, Breschet, Lee, Bouillaud, and others, shall have been duly weighed, as well as those connected with uterine phlebitis and phlegmasia dolens, to which most of the observations made on phlebitis, consequent on venæsection, will equally apply. I will only here add, that, in some cases of phlebitis, the determination to the surface is evinced in a number of abscesses forming in the course of the inflamed vessel; and that amongst the symptoms are, usually, swelling of the limb, hot and dry skin, with a speedily exhausting fever, sooner or later of a typhoid character.

The interesting phenomena, seen in connection with what we term

SPECIFIC DISEASES,

should also be considered; but I have only opportunity at present for a few very brief remarks. The term "specific disease" implies a marked line of distinction, which, like all artificial distinctions, is not always, in a strict sense, demonstrable in nature. But still the term "specific," properly agreed on, may, in the present state of science, be regarded not only as unobjectionable, but as conventionally convenient.

The simplest and least objectionable application of the term seems to me that which refers it to certain affections of the system, which pursue a course singularly uniform in its character, whatever may be the accompanying peculiarities of the individual. Thus, small-pox, measles, scarlatina, *perhaps* syphilis, may, for the sense intended, be at present conventionally regarded as specific diseases; since, although we see them variously modified in their severity, their danger, and their external manifestations, they always present some general similarity (especially the three diseases first mentioned) which is striking: small-pox, for example, appears at present to result from some peculiar principle, which seems to produce a peculiar disturbance in almost any system to which it is for the first time applied, or which has not been previously affected by one other disease, "the cow-pox." I must, however, request the reader to observe that I am here stating rather the general opinion than any well-considered conclusion of my own. Reflection has furnished me with very strong doubts as to the truth of the ordinary impressions of mankind on all these subjects, arising from many facts in themselves indisputable, but which require a vast deal more thought than I have at present opportunity of indulging, before I dare say more on the subject. Looking then at "specific

diseases," as they are commonly termed, we observe that, in all, inflammation is set up on the surface of the body; and in small-pox, measles, &c., as has been before stated, with marked benefit to the individual. We see disturbance of the system; we see inflammation set up on the surface; we see the constitutional disturbance gradually decline; and, as these favorable changes take place, the disturbance on the surface disappears. The close relation of the general and superficial disturbance, as exemplified in small-pox, has been already remarked on. It is interesting also to observe, that, in inoculating for the small-pox, where the matter is presented to the surface, yet the inflammatory disturbance on the general surface does not appear to result from any sympathy of it with that particular surface to which the matter is applied, because the previous disturbance of the system seems essential to the establishment of the general eruption. In measles and scarlatina, similar phenomena are observable, although the disturbance is not artificially excited by inoculation.

In syphilis, also, we observe a remarkable tendency to throw the disturbing actions to the surface, as in the skin and the mucous membrane of the throat; and although, in many cases, the general disturbance is so great as to render parts of low vitality, as the bones, peculiarly liable to become affected,—yet we still observe the same tendency of actions to the surface. First, we observe that there is a great disposition to transfer the irritation of the bones to the periosteum which covers them. Effusions take place beneath this membrane, which are gradually followed by inflammation and ulceration of the skin covering them, although the whole process is slow and indicative of subdued power. It may be further remarked, that the bones most commonly affected are those near the surface; as those of the skin, elbow, nose, and the cranium. If what we call syphilis be *really* a peculiar principle of any kind, it is at least curious that the very same statement applies to the influence of mercury, which I have plenty of facts to prove; and, indeed, I have mentioned the kind of evidence in a case or two published in the "Unity of the Body," and the nature of which is of the kind up to that time wanted, as it deduces the effects of mercury from cases where they cannot be confounded with those of syphilis, because the patients were not only not affected by syphilis, but took mercury for other disorders. The extensive use, or perhaps abuse, of this mineral, however, will probably, before many years are past, afford plenty of similar cases.

I hope hereafter to adduce facts which, whatever may be the *nature* of these poisons, throw considerable doubt over the specific nature of the effects of either mercury or syphilis; and which strongly suggest that the effects produced by them may also result from other sources of disturbance, as dissimilar as they are unsuspected. One case bearing on this point has also been related in the work above mentioned; but the subject is too extensive and important to be conveniently combined with the present argument, or to be introduced otherwise than in its proper place in this work. I may only observe that the facts point at least to the probability that the diseased actions to which they give rise are only modes by which the system endeavours to get rid of them, in common with some other causes of disturbance to which it is more rarely, and, in the present loose mode of investigating cases, less observably subjected*. I have at present, however, neither opportunity nor inclination to press any argument in relation to what we call specific diseases: it is sufficient to observe, that diseases which at first sight present types or evidence of being under peculiar laws, do not at least militate against that law to which I have referred the phenomena of inflammation; but that, so far as they appear to affect the question, they tend rather to establish the universality of its operation.

To return once more to apparent exceptions. We have, unquestionably, inflammations of other internal parts besides those mentioned in this Discourse. There is no structure of the body in which inflammation may not occur,—as the brain, stomach, liver, or any other of the viscera, veins, arteries, absorbents, and so on. There is nothing in the fact of all these parts being endowed with the power of becoming inflamed, that impugns the law of determination to the surface; which I have endeavoured to represent as the one under which inflammation, apart from direct injury, occurs. On the contrary, the very admission of such parts being endowed with this power, when regarded in connection with the very rare occasions on which it is exercised, strongly suggests that they are apparent, and not real exceptions; and shews more strongly, perhaps, than any thing else, the powerful tendency of the law in question.

I have already stated the unmeasured frequency of inflamma-

* It was to cases of disease in which the labours of the natural powers have been enduring and tedious, but ultimately successful, that Mr. Hunter applied the phrase—"the disease wears itself out," as it were.

tion of the membranes of the brain, in connection with cerebral disturbance, as compared with inflammation of the brain itself: the same statement applies to inflammations of the pleura, or lining membrane of the bronchi, as compared with inflammation affecting the substance of the lungs; and of the peritoneal covering in comparison with those of the substance of the liver, or other abdominal viscera. Inflammations of the actual interior or substance of the viscera, then, are indeed very rare occurrences, and very seldom occur as *primary* phenomena in the diseases affecting them; for what we usually call inflammation of these parts, is found, on examination, to be, in the majority of instances, inflammation of the surfaces which I have mentioned. This, again, is the more striking when we regard the vast quantity of blood sent to the organs themselves,—a condition apparently so favourable to one necessary element in inflammation—namely, congestion; and reflect that, whilst the inflammation occurs on the surface, the causes manifestly, in many cases, are directed to the functions of the viscera themselves; even where congestion and disturbance amount to impeded circulation, as often happens in the lungs, still we see, as in asthmatic persons, great efforts to relieve by actions on the surface, in the secretions of the bronchi and skin. And when inflammation does occur, it is only where we have facts justifying a presumption that the laws of Nature are interfered with by want of due power*.

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* I examined a body only yesterday, which presented a very common series of appearances, but which become very interesting when examined in relation to the law in question. I did not see the man alive; but he was a tailor, and I was assured that his habits were very sedentary, independently of the necessity induced by his avocation. He always had laboured under costive bowels, and occasionally great sickness of stomach; and this was attended with indifferent health for the last seven years. During the epidemic and influenza of last year, he was attacked by that complaint, and he never entirely rallied afterwards, ultimately dying with symptoms referring to his lungs, such as exceedingly difficult respiration, occasional spitting of blood, &c.—but not matter, as it appeared at least. His body presented a full, distended gall-bladder, opacity of the peritonæum covering the liver and spleen; adhesions, and opacity of both pleuræ; and opacity of the pericardium covering the heart, one portion of which was become of the structure of cartilage. There was also slight effusion into the cavities of the pleura and pericardium. No observable change, however, could be observed either in the spleen, liver, or heart; but the lungs were extensively tuberculated; and there was a very vascular condition of the mucous membrane of the trachea and its ramifications. This is a very common sort of case, the cartilaginous deposition on the heart only excepted, and which, on being carefully peeled off, shewed the muscular substance not to be involved in it. I therefore make no comment on it, but let the reader make his own.

Thus it is a law, that a wound should heal by certain processes which we can observe; and, in the face of such constant examples of such healing, we never regard it as otherwise than a law, merely because certain wounds cannot be brought to exhibit the reparative processes, or even because they occasionally produce erysipelas or death. Viscera do not inflame, except when the causes producing the disturbance have been allowed to be in continued or repeated operation, as those resulting from errors in diet or mode of living, or until the attempts to determine disorders to the surface have been already made, and certain changes produced in the membranes or surfaces to which I have alluded. Cases, however, may be excepted, in which, from causes not known, there is a tendency to some particular disease,—as scrofula, for example; but all these conditions reduce the powers of life, and consequently modify, impede, or altogether interfere with the carrying out of the laws; and not only the laws of inflammation, but obviously those on which power generally depends, as digestion, &c., and which are necessary to preservation. To develop all that might be urged on this point, or perhaps all that the present state of science renders necessary, would require a book which, unless published under the sanction of very high authority, would, I fear, never be read; or a course of lectures, which I have neither an opportunity, nor a proper arena, for delivering. But I am not anxious to carry men's convictions by storm, as it were. I only beg of my profession to think for themselves; and I look forward with confidence (though I may not live to see it) to what will be the nature of their conclusions. I have thus stated as much as the general objects of this work allow of, in connection with that which I here venture to propose as the law under which every variety of inflammation occurs.

I must beg the reader to recollect that I have been obliged to select, on all points, only a portion of the evidence which bears on the general argument; so, in the selection of exceptions, I have inserted those which to me appeared most striking, or most difficult of explanation: but as different parts of a subject impress various minds in a different manner, it may very readily happen that the suggestions of my own mind in these respects may be different from those which may occur to the minds of others. I am far from regretting, however, that an absolutely full consideration of the subject was inconsistent with the more general, and I hope too the elementary, character of this work; for every thing that is proposed as new, especially if it be important, should be received with caution, and

be subjected to the severest tests furnished by Inductive Philosophy. No author, who is really in quest of truth, will complain of any severity of examination; he will not only patiently abide it, but, for a time, expect not only doubt, but opposition. As I write to different classes of readers, I shall therefore, for the sake of being clearly understood, sum up the argument in a few short propositions, before I proceed to the "General Treatment of Inflammation." It appears, then, that—

1. Inflammation is essentially a reparative process; and that wherever it appears otherwise, it is in consequence of a disturbed condition of the animal œconomy.

2. That as all parts may require reparative processes, so all parts are necessarily susceptible of inflammation.

3. That in the repair of injuries of a mechanical kind, the repair consists in a restoration of the part, or an efficient substitute for it.

4. That all inflammations not obviously instituted for the purpose of repairing lesions of structure, are, without exceptions, endeavours to get rid of injurious influences, by transferring them to the surface of the body; which is the law I propose to establish.

5. That whatever exceptions occur in regard to this law, or in regard to the repair of mechanical injury, they are alike referrible to deficient power; this deficiency arising from a disturbed condition of the animal œconomy.

6. That, in almost every case of failure of the healthy carrying out of the law which determines injurious actions or influences to the surface, we still see manifest types of endeavours at its fulfilment.

7. That the healthy exemplification of *every* law in the animal œconomy requires the presence of *natural* power.

8. That neither heat, redness, pain, nor throbbing, can be regarded as *essential* characters of inflammation.

9. That increase of bulk (swelling) probably is essential to inflammation, though not always demonstrable.

10. That there is no necessary connection between the general mass of blood (*quoad* quantity) and the occurrence of inflammation.

11. That determination of blood to a part (congestion) may occur without inflammation; but inflammation cannot occur without congestion or determination of blood to the inflamed part; wherefore such determination is an essential *element* in inflammation.

12. That, notwithstanding the foregoing be an essential *element* in inflammation, yet the essential *character* of inflammation is increased action of the blood-vessels.

13. That whatever determines inflammation to a part, necessarily first determines the blood to that part; and whatever this be, it is, in a given case, the *real* cause of inflammation.

14. That this will be found to consist in a disorder of some organ, or of the whole œconomy, or both in conjunction; and that the determination to the part takes place in virtue of the sympathies of all parts of the body with each other acting in compliance with the law above enunciated.

15. That, consequently, the *treatment* of inflammation ultimately resolves itself into measures calculated to equalize the circulation, as regards the inflamed part, and especially through the correction of any accompanying disorder; and this we next proceed to consider.

DISCOURSE X.

TREATMENT.

In the treatment of all diseases, the important desideratum is of course to remove the cause of the malady; and where, from the nature of the cause, as in many examples of severe injury, or from our ignorance of it, as happens in many diseases, this cannot be done,—then the chief object is to influence the effects, so as to render them as little injurious to the body as possible.

If I have rendered myself intelligible, and succeeded in giving you true views of the nature of inflammation, the principles of its treatment ought to be clearly deducible from them. Your general plan, whether to remove the cause or obviate its effects, ought not only to be in harmony with those views, but to arise out of them as an unavoidable induction; and, further, not only should any good effects which you may obtain from the application of the principles flowing from such views be in harmony with them, but any success which you may obtain by means which you do not deduce from them ought to be explicable, if not by their aid, at least on grounds in no way furnishing objections to them. Any thing less than this, though it might or might not, according to the extent of our knowledge, overthrow the views in question, would yet justly put them in abeyance, and suspend, at least, our conclusions in regard to them. I know not how they can be subjected to a severer test than that implied in the foregoing: but this test is necessary; nay more, if we could discover any other views which appeared to harmonize in all respects equally well with any explanation of all the phenomena, this discovery, though it might not necessarily prove the views false, would equally oblige us to stop short of conviction, to rest them on probability only, or reject them altogether.

Now these views suppose, as primary facts, nothing but what is demonstrable. In all cases whatever, there is in an inflamed part more blood than circulates in it in health, or in its natural condi-

tion; and this is only another way of saying that the circulation, as regards the *whole* body, is unequal: the two propositions are, in fact, convertible forms of expression.

There is also demonstrably increased action in the part; for whether we use this phrase in the sense of new, different, or additional action, still the fact remains the same,—it is true and demonstrable: and we know of no form of inflammation which does not bear out these primary propositions. They imply, therefore, two states, which being common to all varieties, shades, or degrees of inflammation, must be held as their essential characteristics; and, as regards the subsequent phenomena, as the nearest link in their causation.

It necessarily follows, in pursuing the chain of causation, that the next link will be found in any thing which can determine more blood than usual to a particular part: and though the influences capable of doing this be one or a thousand, it matters not; for they will all have this property in common; that they are all capable of producing the first, and always a necessary element in inflammation. Since, as I have before observed, although more blood may be circulating in a part than usual, without the necessary induction of inflammation, yet inflammation cannot occur without there being more blood in the part.

Now you have already seen that the circumstances capable of determining more blood to particular parts are exceedingly various. Local injuries, mechanical or chemical, are one class of causes; and the multiform phenomena of sympathy shew, that, as any one part of the body may sympathize with any other part of the body, and as the mode of manifestation of this sympathy may be very various, so determination of blood to a part may be one of them, as has been already sufficiently impressed.

Further, as mechanical or chemical injuries form but one, and that certainly not the most dangerous, and perhaps even not the most numerous, class of cases which we have to treat, so it follows that certain conditions of the body, whatever those conditions may be, must be regarded as a very fruitful source of the causes of inflammation; and, as the sympathies of parts present at least one competent cause for the institution of the first element necessary in inflammation, hence they must be regarded as at least one source of its causation.

It has also been suggested that inflammation is a process of which the natural tendency is essentially preservative, whether we

use this term in the sense reparative, as in mechanical injuries, or as preserving the health of the body, or restoring it when subjected to injuries of a nature more refined or more general in their operation; and that, in this repair, the natural law consists in a determination to the surface of the body; and that, where this natural law is not carried out, there is an absence of natural power.

Here, then, as regards the chain of causes which produce inflammation, we arrive at another link; viz. in that state of the œconomy, or of any part of it, which rendered that determination of blood to a particular part (the primary element of inflammation) necessary; for this must be, as it were, the ultimate link in the chain: since, although the power which determines the blood to a particular part be exercised by the vital properties or sympathies of this or that organ, and although the cause which renders the exercise of this power necessary may be proximately referred in many cases, and perhaps in all, to the organ in question,—yet the induction of that necessity may have resulted from influences directed to it through its sympathy with other organs. Thus, suppose there be a state of liver, for example, producing determination of blood, and inflammation in the skin, or in the membrane which covers the liver (the peritonæum), the proximate cause may be in some disordered condition of the liver; but then this, again, may be a primary affection of the liver, or a sympathetic disturbance resulting from its sympathy with the stomach, or skin, or some other organ. Or if the primary determination of blood to a part, and the institution of inflammation, be the consequence of local injury, and the natural and healthy conduct of its repair be either imperfect, or altogether fail, the absence of the natural power may either result from the state of the œconomy, as induced entirely by the primary condition of a particular organ, or from this condition as the nearest link; the farther one being in the disorder of some other organ, by which that of the one representing the proximate link may have been occasioned.

The objects then, in the treatment, appear very manifest; and the first is, to discover what agent that is which has determined the blood to a particular part; secondly, what agency it may be which maintains that condition; thirdly, if we cannot discover these, supposing them to involve different agents, which is often the case in local injuries, the next point is to minister to the next link in approximation, and endeavour to remove it (if the removal of the

cause be impracticable) by any other means in our power. In other words, we should attempt to equalize the circulation; and, if we cannot affect the subduction of inflammatory excitement by taking away its essential pabulum, *through such equalization* of the circulation, we then try whether we cannot either take it away by some artificial means, as local or general blood-letting; or determine it to some other part, by creating an inflammation in a part where it is either less dangerous, more manageable, or both; or, by reducing the power of the body universally, to reduce that of the part, so as to deprive it equally of the power of determining blood to it, or that of making use of it for purposes of inflammation. These, then, are the several points involved in the treatment of inflammation. I would add, however, that, if inflammation be an attempt to determine injurious influences of a general kind to the surface,—if that this be the law, and that the exceptions which appear as such be merely interferences resulting from absence of natural power, —we should reasonably expect most benefit *(cæteris paribus)* from all measures, whatever their nature, which either acted by equalizing the circulation, by determining, *somehow or other*, to the surfaces of the body, or by both in conjunction. Now, hitherto, the treatment of inflammation, though it involve many of the points which I have mentioned, has been, as it appears to me, conducted on a wrong principle; it has begun at the wrong end, as it were; and even though it sometimes, in a practical sense, accord with true views, yet, where it does so, the views are not perceived; and, though the many parts of the plan may be abstractedly right, yet (as has not unfrequently happened) they have arisen out of an hypothesis in itself false, or been altogether a matter of empiricism.

It is necessary however to premise, that, in discussing the treatment of inflammation, we for the present put those occurring on the surface of the body out of the question; because, whilst their treatment will sufficiently appear as an obvious induction from the general discussion, it yet involves certain details in its application, which will be more conveniently mentioned in connection with the diseases which they form; the more important of which will be included in the present volume.

We therefore, in discussing the treatment of inflammation in general, are supposed to refer to those more serious examples of it which involve internal parts of the body, and which threaten the safety of the individual; such as inflammation of the brain, the

various viscera, or the membranes which invest them, &c.; and, if we refer to inflammation of a more local or visible character, it will be merely for purposes of illustration.

Now, in all cases whatever, the first thing to be done is the placing the whole body, or any part of it, under circumstances least calculated either to maintain the causes or exasperate the actions or effects of inflammation; and this may be regarded as the negative treatment: such as absolute rest, that the circulation may not be excited by motion; stopping the supply of blood by cutting off the supply of food; emptying the bowels,—since, whatever the cause, a loaded condition of these viscera is found practically to give it additional force—and you will recollect I am not now talking of purging, but simply evacuating their *contents* by rapidly repeated doses of aperients, of which jalap, on account of its celerity and certainty, may be preferred; and the washing the bowels out by copious injections of warm water.

This should be thoroughly and efficiently done, not merely by injecting a pint or a quart, or any other definite quantity, but, by means of an injecting syringe, as much should be thrown up as the patient can retain; he will then perhaps instantly void it; and, if the quantity retained do not seem sufficient to have pervaded the lower bowels efficiently, the injection should be immediately repeated—a very few minutes sufficing for the whole operation. I can assure you this is very important. I have often seen cases where the less efficient use of injections has done no good whatever, but where the more effectual mode has been of the most unexpected benefit, although the syringe had been alike employed in both cases, and this not merely in inflammation—of which, more hereafter. I say, then, rest of the body, and of the part; the avoidance of all excitement, bodily or mental; great quietude, silence to the ear, subdued light or darkness for the eye, and so on; absolute abstinence, and evacuation of the bowels;—now, this I call the negative treatment. You will often find that, in cases not distinguishable from commencing inflammation, nothing more is required; but these are not the cases you will have for the most part to treat, nor are they those to which I am about to refer. The inflammatory symptoms are progressing, and your positive and indeed very active treatment becomes alike necessary. Your treatment should be founded on clear views of the individual case, and be alike prompt and energetic; you should have well considered the subject *generally* before hand. With this prepara-

tion, the rest is simple; but, if you have to think of things for the first time in the anxiety of a sick room, a person of good common understanding, out of the profession, will be more competent to treat a case than you will.

The foregoing observations are general, and apply to all inflammations; but, in directing the other parts of the treatment, some points will be general, some will apply to particular cases. The first thing is to ascertain the seat of the malady; to ascertain that inflammation is present. This is done by the observation of obvious phenomena (the symptoms); and here we see the *element* which morbid anatomy forms in pathological investigations; for it is from the observation, in certain cases, of certain appearances after death, in connection with certain symptoms whilst living, that, in other cases, we infer similar results, and thus learn to recognize to what part the *symptoms* refer. Having then determined the seat, we next enquire the cause: and now you will recollect that the sympathetic influence of any one organ may produce congestion, the necessary element of inflammation, in any other. Hence we now see how important is the practical result; it being no less than this, that the *seat* of the inflammation, and the situation of its *cause*, may be very different; and we further find indeed (local injuries excepted) that they are seldom the same. Another thing arising out of this is not less important; viz. that the cause of the inflammation will generally be most auspiciously sought in the previous history or habits of the patient; and this not only as regards habits of daily occurrence, but certain aberrations from these which, though only occasional, involve any series of repetitions. For the sake of example, a man's daily habits may be those of moderation; but he may indulge in occasional excesses, even beyond the average acceptation of that term: he may be, as regards daily habits, sedentary; but may occasionally take lengthened or violent exercise: he may, as a daily matter, have regularity of his functions; but occasional interruptions may have occurred, in which he has adopted particular remedies, and so on: or his recent habits may have, for months or even for years, been such that they are not perceptibly calculated to injure any organ or disturb any function,—yet, antecedently to a given period, they may have been very different; so far indeed as, on the contrary, to have been characterized by any or every species of excess or irregularity. In other cases, the history may unfold the occurrence of some serious disorder at a former period, in regard to which a knowledge of the general nature of the reme-

dies employed will often be of the most essential service to our investigation; and why I am so anxious to impress all this, is, that it is equally important in detecting the cause of other maladies, as it is often *essential* in eliciting the cause of inflammation.

All this is equally necessary in cases which are called surgical, as it is in those usually termed medical; since, even in inflammation after accidents or injuries, if the danger result from the inflammation, it depends on the condition of the body; which brings us to the same point, and renders the same kind of investigation necessary, in order to ascertain what that condition really is. All this is seldom sufficiently, if at all, done. I cannot perhaps better exemplify what I intend than by the relation of a case or two; and, to shew the identity of plan as applicable to cases which usually fall under the care of the physician or surgeon respectively, cite one of each.

CASE, *USUALLY TERMED MEDICAL.*

I was called up one night to visit a gentleman in the country, concerning whom, when I arrived, I received the following account: He had been ailing about nine days; but, until a day or two previous, had been going about as usual. His ailment began by a sharp pain on the right side, referred to the situation of the eighth rib, near its greatest convexity. This pain had subsided, and again recurred; and this had taken place when leeches and a blister had been applied, as also when no such remedies had been employed. The pain had also been accompanied by cough, which, however, did not subside altogether on the cessation of the pain. As the symptoms recurred, and even in an exacerbated form, he had been treated by aperients, and subsequently by saline medicine, containing small doses of one eighth of a grain of tartrate of antimony; but the case did not seem to have been alleviated by the means employed; on the contrary, the symptoms referring to the chest continued to increase, until inflammatory congestion there became so evident that his medical attendant, a very intelligent man, at once an active and cautious practitioner, thought it necessary no longer to postpone bleeding him: on his proposing this, however, the patient refused to submit to it, and desired them to send for me. When I arrived, I found the patient in the following condition: His countenance was anxious, and, towards the external angle of

the eye, a little haggard; he could not be said to be delirious; he knew me perfectly when I entered the room; but he had become very intractable, and his countenance was very expressive of commencing cerebral disturbance; and a little examination confirmed this impression. I had some difficulty in bringing to his recollection that he had had any pain in the side; but, after repeating the question three times, he pointed to what had been its seat: I could not find that he had any pain now. He seemed also to have a striking unconsciousness of his situation. He complained of great oppression, however, about the chest; and was coughing frequently, and expectorating considerable quantities of mucus, tinged by blood. His pulse was very excited, and 120 in a minute, but not hard. His heart was very noisy, and (on placing my ear to his chest) seemed to emit as loud a sound during its relaxation as during the contraction, whilst it was acting with great violence: yet he could breathe pretty freely when desired to do so. His skin was moist; his tongue *moist* also, but exceedingly vascular at the sides; whilst the centre was coated with a deep yellow, and in parts with a very dark fur. His kidney was not secreting copiously, nor very much otherwise, his urine having been chiefly voided during the evacuation of his bowels; that voided at other times was high-coloured. His bowels appeared exceedingly irritable; the one eighth of a grain of tartrate of antimony having been followed by eighteen or twenty evacuations, these being almost entirely fluid. His whole condition impressed every one, his medical attendant and myself inclusive, with the idea that he was in great danger; and whilst we both regarded it as a difficult case, we both agreed that it came more under the description of that case which is called typhoid pneumonia than anything else. Now, the previous history of the patient was, that he was a temperate but full liver; that he eat meat commonly twice a day, and sometimes three times; that he drank beer, and a few glasses of wine after dinner: that, on convivial occasions, he would do something more than this; but that he was never what is usually understood by the word intemperate: that he took a good deal of exercise, without this being of a very violent kind: that he walked about a good deal daily, and rode on horseback occasionally: that he regarded himself as of a bilious habit, to correct which he occasionally took a little rhubarb and soda, as the leading indication was a sensation of acidity in the stomach; but that his health was regarded as habitually perfect, though, for the last twelve months, he had now and then been sub-

ject to cough, of which he took little or no notice. I should have mentioned that percussion of the chest elicited a dull sound on the superior part of the *left* side; and that, for the last two years, he had been getting rather stouter than usual.

OPINION.

Now, looking to the chest, considering that he lived in good air, that he took exercise, that his chest was well formed, that he had never had any symptom of disorder there before, that there was no evidence of his having caught any cold, I did not think that the *cause* of the inflammatory disturbance referred to what was evidently the *seat* of it; neither could I satisfactorily make out that his stomach or bowels were the cause of it, since his bowels had acted copiously at all events, and were *habitually* regular, and his stomach had recently been subjected to no particular, nor indeed anything approaching to its ordinary, sources of excitement. To the skin I could refer nothing in the way of causation; because, in the first place, there was no evidence of any injurious impression having been made on it; and, secondly, it was acting exceedingly well: nor could I find any particular fault with the kidney; since, the state of the skin being duly considered, it was difficult to make out more than that the urine was rather high-coloured. By this kind of negative reasoning, I arrived at the consideration of his liver. He had no pain nor tenderness there, certainly, nor in any other part of the abdomen; and it was also true that the pain he had experienced might be referred perhaps to the chest, with quite as much probability, to say the least of it, as to the liver: but then I thought both his temperament and habits such as frequently led to disorder of this viscus; that, although his symptoms did not evince any inflammatory action about the liver, they presented nothing *inconsistent* with a plethoric condition of the organ. Again, his bowels, though acting so profusely, shewed no profuse, nor even ordinary, secretion of bile; whilst, on the other hand, I knew that congestion of the liver was at least competent to disturb the organs of the chest. I therefore said to the medical attendant—first, that I thought the real cause of the mischief would be most rationally referred to the liver; and, secondly, that I should act (he agreeing) entirely on that opinion, even *for the moment at least*, to the exclusion of bleeding; that, although I spoke with that caution which became a

knowledge of our difficulty, yet my opinion was, as an opinion, decided; that his getting better, however (should that fortunately happen), would, of itself, by no means satisfy me of the correctness of my opinion, unless he did so simultaneously with discharges of morbid or increased biliary secretion. The medical attendant seemed pleased with the rigour of the test I proposed; but appeared at first somewhat unprepared for such views: however, he was, as I said, an intelligent man; he evidently thought for himself; and, on my going over the reasoning which I have already stated, he agreed that there was something very feasible in my views, and, in short, seemed at length to participate in them. We accordingly acted on them in the following manner: We gave him three grains of calomel every three hours, and three quarters of a grain of opium with it, on account of the great irritability of his bowels. If the bowels bore this well, the opium was to be gradually diminished; and, to avoid irritation of the bowels still further, as also from my experience of its effect in promoting perspiration, we directed efficient enemata of warm water or gruel to be given, night and morning, with as little fatigue to the patient as possible.

I appointed to see him again after about thirty-six hours; the understanding being, that I was to be sent for immediately, if anything went wrong. At the end of this period, I again saw our patient; and the result was very gratifying. He had lost all oppression about the chest; the pulse was ninety-six, and rather feeble; the tongue improved; he had had a good night; the bowels had acted from the pill, discharging a quantity of biliary secretion, dark, fœtid, and, as the patient said, "like bird-lime;" the cerebral disturbance was gone. He was allowed to take minute quantities of beef tea, with morsels of toasted bread, for which he felt decided inclination. We now diminished the dose of calomel and opium; but, on relinquishing it, he had a slight return of his symptoms, which, however, were again relieved by the same measure, except that now the opium was diminished to one-fourth of a grain. His recovery was otherwise uniformly progressive; his resumption of ordinary diet being *extremely* gradual. The calomel was gradually diminished, and an occasional blue pill, when the secretions suggested it, given at night,—being the only medicine, except, as he got better, some infusion of columba.

Now this case was very striking, as testing the general practice in such a case. I mentioned it, whilst under treatment, to different medical men; they all, with one exception, said you must bleed

the patient. One gentleman, however, seemed to appreciate the circumstances: "Ah!" said he, "it is a bad case, sir; you will not save him." I may observe that, even when he was so far better as to be considered (imprudence apart) out of danger, nothing could convince a relative that he would recover, as she said she had seen his father and his brother die with precisely the same symptoms.

Now, how valuable this case is! The bleeding, to say no more of it, would have been unnecessary; but, when we consider that his state was already one of excitement, which was followed by great debility, the clear resemblance it bore to that state which so often *terminates* in typhus, we should perhaps not say too much, in assuming that it would have been prejudicial. But, further, the success in this case was in consequence of similar modes of examination having previously furnished me with similar information in cases, not perhaps identical in all respects, but analogous in their essential characters. I will now state another case, which, as regards the order of the symptoms, would be termed medical, but which involved surgical matters also.

CASES OF FEVER, WITH THE SUPERVENTION OF ERYSIPELAS.

A man-servant in a family, who was very fond of indulging in eating and drinking, but whose organs for the disposal of such matters were often deranged by the quantity of work given them, was frequently ill in consequence; and I had, on several occasions, put him right by prescribing an aperient, with low diet; but, in spite of my repeated warnings and his own fears (for he was always exceedingly alarmed when ill), he continued to indulge; and even began to do so, on one occasion, the very day after the cessation of slight cholera, not Asiatic, but still occurring at the time that the Asiatic cholera was prevalent. At length, after an unusual indulgence, even with him, he was taken ill, with cold shivering, followed by heat and excitement, with red and furred tongue. I saw him in the evening, and gave him an emetic and a purge; and the next day he was a great deal better; but he complained of soreness on the right side of his chest. At this time, the family having some of their other domestics ill, it was proposed to send this man to an hospital, whither he went the same day. As I was going that way two or three days afterwards, I called at the hospital to see him;

and I shall never forget his appearance. When directed to his bed, I really did not recognize him, and was going to another bed, when a faint smile of recognition shewed me that the face so changed was really that of the patient I sought. His countenance was haggard, the cheeks wan, their bones very prominent, his tongue very foul and dark, pulse rapid, and in such a state that I at once made up my mind that he could not possibly recover. But, as I could not understand the case, having seen him exactly in similar conditions to that in which he went into the hospital, and from the same cause, I waited on the apothecary, the physician not being there, to learn more of the case. On expressing my difficulty in understanding so rapid a decline, &c. the apothecary, a man exceedingly well informed, said, "I suppose you know that he has been bled?" "Bled!" replied I; "for what reason?" I now saw that the apothecary neither understood the reason, nor agreed in the propriety, of this measure; but still he did not appear fully to agree with me as to its consequence; for, on my adding that the man would certainly not recover, he rejoined, "I hope things are not so bad as that either." Now the tenderness of the side, of which the man had complained, developed itself into erysipelas, for which he had been bled to twenty ounces: incisions were made, the erysipelas having got rapidly worse instead of better, the incisions being made with my own concurrence. In the mean time, the rapid failure of the man's powers, after the bleeding, put all resources of this kind out of the question; and, in spite of every care, attention, and support from wine, &c. he sank and died.

In relation to the effect of the bleeding, it was very important to know whether it had subdued his powers, as the progress of the case and the nervous system of the patient seemed to shew, by a direct agency, or whether it had acted on a system previously weakened by any serious affection of any organ. The gentleman I have already alluded to examined the body; but no disease of any organ was discoverable; whilst the whole case, as well as the erysipelas, evinced mere want of power; for I should have mentioned, that, whilst the erysipelas had not extended, there was not the slightest evidence of repair. This was a case in which, had the real cause of the disturbance, including the inflammatory localization of it in erysipelas, been made the basis of treatment, I have not the slightest doubt but that the man would have recovered; since, on many occasions, his recovery from similar condi-

tions depended on such a mode of treatment; whilst the benefit resulting, for a few hours, from his treatment previous to his leaving his home, is perfectly consistent with this view of the subject. The cause of the malady was essentially functional disturbance of his digestive organs; the remedy ought to have been its correction, which, from what had happened on former occasions, and even in the one in question, so far as the case was so treated, would probably have been safely effected by aperients, abstinence, and perhaps small doses of tartrate of antimony, or other medicines of that class. In further illustration of these views, and modulating, as it were, by degrees, from medical cases (so called), though a mixed case, into one that would be termed surgical, I will mention the following, because it is remarkably analogous to the first case, although the disease *commenced* by actions for which people usually consult surgeons*.

CASE.

William Smith, æt. sixty-five, by occupation a hackney coachman, was admitted a patient of the Finsbury Dispensary, with a very curious affection of the right arm, which had existed several years, and which presented the following appearance. The arm was considerably larger than the other, and its natural symmetry further disfigured by great irregularity of form, being much larger in some parts than others, and presenting in different parts a series of openings, through which a thin, unhealthy discharge issued, its quantity varying at different periods; and shewing also that some openings had healed, whilst others had formed: the manner in which the openings formed being as follows:—first, an elevation of the integuments would take place, which was not discoloured; but presented an appearance best conveyed by saying that it was tuberculated rather than inflammatory. At first these ulcerations were firm, then they would become soft, and then a little inflammation, accompanied by its more usual characteristics, viz. heat, redness, &c. would be established on one point; and this bursting, matter of the description which I have mentioned would be dis-

* This case was to me the more impressive from my having under my care, at the same time, a young gentleman whose case was an exact parallel, except that the excitement, both local and general, was much greater, but who was not bled, and who did perfectly well.

charged. The whole limb was so strikingly that of a case of diseased bone, that at first I had no other idea; but I wished him to come to my house, in order to investigate the causes of his complaint more narrowly; since many circumstances convinced me that the man spoke truth, when he asserted that he had always been particularly temperate, and not at all addicted to the mode of living so usual amongst men who follow his avocation. When he came to my house I examined his limb with great care; and although some difficulty resulted from tracing the bones through much firm, misshapen, and irregular thickening, the result of various deposition in the cellular tissue,—yet I convinced myself that the bones had undergone no change; and began to investigate the case, under the idea that it might be one of diseased absorbents. The examination of the case soon convinced me that this was not improbable, and the subsequent experience of it confirmed the opinion.

Amongst other circumstances, there were two firm, cord-like lines, felt deep on the inner side of his arm, as far as the axilla, without any discolouration or tenderness: pressure on these chords communicated an elastic feel, and all the sensations of a vein, supposing its coats tense and thickened: both these disappeared under treatment. This part of the case I shall have occasion to talk of hereafter: I will therefore only add here that it had got much better, and was altogether progressing favourably under treatment directed chiefly to the improvement of his health; so that now we only saw him occasionally; and all this under very difficult circumstances, since he followed his employment all the time; when he sent to request that he might be visited at home, as he was very ill. When seen, he was labouring under nervous excitement; he complained of great pain and tenderness, both in his limbs and his abdomen; the tenderness being most remarkable in the region of the liver, extending low down on the right side, and across to the middle of the lower part of the abdomen. He did not know to what cause to attribute his present ailment; but a horse had trodden on his foot about a week before, and erysipelas appeared to have supervened, with red lines running from the inflamed part up the limb, indicating inflamed absorbents; tongue furred; bowels costive; urine scanty and high-coloured; pulse frequent and sharp, indicative of great excitement, but little power; motions dark. He was ordered to take nothing but weak gruel; His bowels were opened by half a grain of calomel and eight grains of jalap, given every three hours till it operated; and after that he

was to take two grains of calomel and one-sixteenth of a grain of tartrate of antimony every three hours. This was on September 25th–26th; bowels freely opened, motions still dark, symptoms much the same: 27th, no improvement, bowels open, motions still dark, urine scanty, no particular alteration in the foot; eight leeches are ordered to be applied to it; a saline aperient with half a drachm of vin. colchici every four hours: 28th, rather better, pain not so violent, *urine more copious*, inflammation of the foot diminished, bowels freely open: 29th, pains less, but feels weak, pulse frequent and feeble; to omit the mixture and take infusion of bark, with ten drops of dilute sulphuric acid, three times a day; no appetite, but allowed to take small quantities of beef-tea frequently: 30th, still weaker, face swollen, eye-lids and side of the nose occupied by erysipelatous inflammation*; the acid to be discontinued, and five grains of the subcarbonate of ammonia to be substituted. October 1st, getting better; to take a glass of port wine, and to repeat it in two or three hours if indicated: 2nd, the wine, although he only took it once, was followed by a violent pain in the stomach; the pulse to day is full, frequent, and bounding; tongue dry and furred; the skin not without perspiration, but the motions still dark and very offensive; the decoction of bark to be given instead of the infusion, and the acid resumed instead of the subcarbonate of ammonia; hydr. c. creta gr. viii to night, and to be repeated in the morning: 3rd, much the same; complains of pain and tenderness in the side; skin hot and dry; tongue, however, moist, and, although furred, is not brown; and he had two evacuations of a yellow colour, and not offensive; to take pil. hydrargyri gr. iv, ipecac. gr. ii, extract of henbane gr. v, to-night and to-morrow morning: 4th, better; one motion, scanty but yellow.

I need not pursue this case to its termination in detail; it is sufficient to observe, that we now decided, that if we could support his strength, we should obtain most benefit by acting more decidedly on his liver; and, therefore, whilst he was allowed any little support which he fancied, which was very trifling, we gave him calomel, with small additions of opium, in repeated doses. The effect of this was, that two or three daily evacuations were produced, which were first dark and offensive, but subsequently of a healthy colour. The tongue, which hitherto had been coated with a fur

* His breathing, which had been all along oppressed, now became very laborious, indicating accumulation in the bronchi, which he appeared too weak to discharge.

almost black, now became clean; the appetite returned, and the diet having been progressively increased from small quantities of beef-tea, with sparing, though frequent allowances of wine, to plain boiled mutton, exclusive of fat, grease, &c.: the patient recovered.

Now, the foregoing case is very instructive: you see—bleeding apart, which a careful examination of the case shewed to be a very doubtful measure, and which I am persuaded would have sunk him—that the treatment was conducted with an especial view to correct that organ which was most prominently in fault; but yet, with an endeavour to assist this effect, by such combined appeals to the sympathetic influences of other organs as the case suggested: and that, notwithstanding the appearance of some small degree of success in these objects, his powers began to fail; that bark, wine, and ammonia were substituted; in fact, that the treatment involved, though perhaps with more specific objects, all those circumstances which really take place in the ordinary and admitted treatment of such cases. You however observe, that the man was at length in a position strikingly analogous to the first case: there was the same state of nervous system, the same state of chest, the same nervous excitement, the same indication of debility; but all in an exaggerated form, and in a much older man; and that we were driven at length, by the failure of all other measures, to restrict ourselves, in the end, to the more powerful adoption of that of which the commencement of the treatment formed a type, and which were from choice adopted in the first-mentioned case from the beginning, and with the same success. I certainly never saw a patient recover before from the same condition in which this man was; and although I apply this observation more emphatically to the latter part of his case, yet it is equally true, with regard to the excessive nervous excitement and the accompanying debility, to all other periods of it.

Now we shall have to talk of erysipelas again; and in the mean time you will say, perhaps, that you should like to have an example illustrating the effect of the treatment of inflammation, founded on the connection of the disturbance of the general system, or with any organ, in which the inflammation was, in common phraseology, more pure; that is, presenting the characters of ordinary inflammation as distinguishable from erysipelas, or any other of its multiform varieties. In the present state of medical opinion, this is a reasonable requisition. I will therefore give you an example of this; but it is necessary to premise that this is difficult,

not from want of evidence as regards the effect of treatment, but from the fact, that those inflammations to which we refer, when discussing the treatment generally, are out of sight; wherefore we cannot say with certainty whether they may have what we call the characters of pure inflammation or not. For if we take inflammation of the peritonæum or pleura, we cannot see that those external characters by which we distinguish erysipelas and other forms, are those of pure inflammation, because we cannot see them at all. And if we allow the inferences deducible from the observation on dead bodies to be applied to the solution of similar phenomena of symptoms as exhibited on the living, we find the appearances corresponding much more nearly with erysipelas, or at least quite as much as they do with what we call pure inflammation. Where, for example, do we find, in pure inflammation, that rapid or violent extension of it, which not only takes place in, but is so striking a characteristic of inflammation of, the pleura and peritonæum; and to which state shall we liken those irregular and abortive attempts at adhesion and circumscription of inflammatory action by which inflammation of these membranes is doubtless also characterized? As regards the extension, they are exactly analogous to erysipelas; whilst in the manner of their adhesions, in these dangerous cases, they are mere shadowings of the adhesive process as we see it bounding pure inflammations: and this, be it remembered, notwithstanding the characteristic disposition which these parts have to such adhesion. We see these healthy adhesions in wounds, and in certain cases of hernia, as familiar occurrences; but then they have been essentially reparative in successful processes, induced by local injury,—manifestations of naturally excited powers; and not the productions of functional or organic disorders. To give you, then, even what you require, or the nearest approximation to pure inflammation, if there indeed be such a thing, I must take the eye; because here you can observe, at least, what approximation there is to our notions of pure inflammation (occurring without mechanical injury), and you can watch its influence, under treatment, with a precision obviously impossible in the cavities, or in the concealed viscera of the body.

Now as one of the first circumstances which led me to think on what might be the real causes of inflammation may possibly have a corresponding effect on other minds, I will, in the first place, state, that, many years ago, there was a patient in St. Bartholo-

mew's Hospital with an apparently pure inflammation of the eye, which, although pretty actively treated in the usual manner, did not seem to yield to the measures employed. I have the most vivid recollection of this case; and, were I a draughtsman, I fancy I could draw a pretty faithful sketch of it at the present moment. It was not distinguishable from common inflammation of the conjunctiva; but, as I have said, it did not yield to the usual anti-inflammatory treatment. The bowels being costive, the patient took an active aperient, which produced, *during the night* (probably when warm in bed, and the skin favourably circumstanced), profuse discharges from the bowels; but what followed? why, the next day there was scarcely a vestige of inflammation. Now this was instituted, you observe, with nothing more than a general intention; and what the particular condition of the nervous system generally might have been I know not; but I never forgot the fact, nor ceased, at intervals, to recur to its consideration. I will now tell you another

CASE.

A man applied at the Dispensary to be treated on account of an active inflammation of the eye. The conjunctiva was very vascular, and slightly raised from off the subjacent membrane (the sclerotica), though not so much as to make the cornea appear as if situated in a depression, as in the state which we term chemosis. There were an ulcer of the cornea and opacity of the inferior portion of the membrane. He had pain extending to the globe; intolerance of light: his bowels were regular; in fact, rather inclining to a relaxed condition: his pulse full and strong, but irregular, and intermitted occasionally: his tongue exceedingly furred; but I do not recollect that he complained of deficient appetite: his tongue was, notwithstanding, remarkably coated: and, on examining all the features of the case, it was in no respect different from pure inflammation. I was disposed to think that his aversion to, or intolerance of, light was hardly so great as the degree of inflammation might have led me to expect. As I had a very good opportunity of watching the case, through the assistance of Mr. Leigh, I was determined to try what influence I could produce by measures directed to what I believed to be a competent cause of the inflammation, and which was, at all events, a very obvious indication of disorder; viz. the stomach, as indicated by the tongue. The treat-

ment was therefore entirely directed on this principle; and I requested Mr. Leigh to visit the case at short intervals, directing him, should the inflammation of the eye appear to make any progress, at once to institute the ordinary treatment of inflammation, in the most active sense of the term; but, in the mean time, to keep the reasoning clear, even leeches were interdicted. I prescribed the man an emetic; and this was to be repeated in the morning, subject to Mr. Leigh's observation eliciting no change contra-indicating it. The emetic operated, and was repeated, operating well on both occasions; and the eye improved so far that the pain was much mitigated; but the inflammatory appearances were not perceptibly altered; certainly, however, they were no worse. As the pain subsided, however, the intolerance of light seemed rather to have increased. His bowels continued open; but his stools, having been observed, were reported to be light-coloured, and he was ordered a pill, at night, of three grains of calomel, with fifteen of the extract of colocynth. The next day, the *bowels* had acted, the motions still light, but *the urine high-coloured;* the eye was still better, the vascularity of the conjunctiva less, and the iris, concerning which we had been anxious, not getting a good view of it through the opaque cornea, was now seen to dilate freely on the application of belladonna. This man now took no other medicine than a weak solution of sulphate of magnesia, with one eighth of a grain of tartrate of antimony, every morning; the inflammation gradually retiring, and the ulcer healing: so that, having been altogether fourteen days under care, he was discharged well. His diet, at first, was simply gruel and toasted bread; and, though sparing throughout, yet a little broth or beef-tea was allowed as the inflammation retired. But you observe that he lost no blood, and that his treatment consisted entirely of medicines directed to correct the obvious disorder of his stomach primarily, and then his liver; the remainder being merely an aperient, combining one eighth of a grain of tartrate of antimony, with a view to promote gentle perspiration. I believe also that his stools lost their light colour; but, as the state of the bowels at the conclusion is only mentioned generally in the notes, I cannot state that the fact was so.

The following case is also interesting, as shewing that kind of link which connects sympathetic functional disorder with the subsequent induction of inflammation.

Isabella Cranmer, aged thirteen, was admitted into the Dispen-

sary with pain in the right eye, accompanied by total loss of sight. She described the pain as very severe, and shooting to the back part of the head. The pupil was somewhat contracted, and the iris tarnished in brilliancy. There was intolerance of light, with disposition to keep the eye shut. The tongue was furred; the bowels costive; the secretions reputed to be discoloured. She was ordered pil. aloet. gr. x, saponis, gr. v, every four hours, until the bowels should be freely opened. The bowels acted freely, and the eye immediately improved; that is to say, the pain became much mitigated, and there was even very slight degree of vision. The case continued to improve without interruption until the eleventh day, when there was a relapse of the symptoms. We could not discover the cause of this relapse; but a careful enquiry elicited that the kidney was not performing its usual duty, the quantity of urine being small: wherefore, regarding this as a likely channel for acting sympathetically on any other organ that might be disordered, we simply ordered her some nitrate of potash as a diuretic. This produced no increase in the urinary secretion; but the bowels acted this morning, the evacuation being of various colours, and containing a number of small worms. We now resumed the pills of aloës and soap: her secretions became of a more natural colour, and more worms were voided. She now got well without further interruption, having voided no worms for ten days previous to her discharge; her vision gradually but perfectly returning, and the pain and other symptoms pointing to deep-seated inflammation having all subsided. In the course of the treatment, Mr. Leigh recognized the case as having been under my care about four years previously, and being, on that occasion, inflammation of the conjunctiva and cornea, with hypopyon and iritis, and having been then also treated by removing what appeared to be the real causes of the inflammation.

The following is a summary of the notes of her case, taken at that period; she being then nine years of age. She applied with an affection of the eye, presenting the appearance of catarrhal ophthalmia, the conjunctiva very vascular, and red vessels extending on the cornea; pain not severe; little intolerance of light; abdomen tumid; alvine functions irregular. Hyd. cum cretâ, and rhubarb; low diet. The eye to be covered with a green shade; poppy fomentations and leeches to the eye-lid. At her next visit, which was not till six days afterwards, inflammation much augmented; states that she became much worse two days since: there

is opacity of the cornea, and matter in the anterior chamber—hypopyon. (This exemplifies the difficulties we have to encounter in dispensary practice, from the irregularity of patients in attending, or even sending reports, in order that they may be visited.) The eye was now treated by leeches and calomel, gr. ii. ipecac. gr. i. ter die; blisters behind the ears; and the extract of belladonna on the brow, in the usual manner, as the iris looked in a doubtful condition. To these were added aperients, when necessary. The effect of these measures was so far good, that the matter in the anterior chamber became, in some degree, absorbed, and the cornea more clear; but, although the mouth was affected by the mineral, no further improvement was effected by it; and she could distinguish nothing with the affected eye. Lymph also became effused on the iris. Besides this, the other eye now became affected; when the circumstances pointing to the alimentary canal (I mean the tumid condition of the abdomen and the disposition to costiveness) determined me to direct our measures exclusively to those viscera. She was therefore ordered one grain of calomel and five of the aloetic pill every three hours, until the bowels were freely evacuated. This object having been effected, the eye instantly began to improve, and so rapidly, that she could at once distinguish some objects. The bowels were now kept open by a repetition of the pill night and morning. The eye continued to progress favourably without interruption; the cornea becoming clear, and vision completely restored.

We here see the ordinary treatment of inflammation, pretty actively pursued, considering the child was only nine years of age, producing some improvement, but without the functions of the organ being restored: we also see that, simultaneously with a free evacuation of the bowels, the case improved progressively, until the inflammation was subdued and sight completely restored.

Here is another case, in which, although I perceive by the notes that twelve leeches were employed, still it seems reasonable to infer that such a measure had not much influence on the treatment. I select it, however, because in other respects it appears instructive.

Samuel Oliver, an unhealthy-looking young man, with a withered arm, the sequence, he says, of an attack of paralysis when he was a boy, applied on account of an inflammation in his right eye. The conjunctiva is much inflamed; and there is partial opacity, with a deep ulcer in the cornea. He has had a

good deal of pain, shooting to the back part of his head; the aqueous humour is turbid; and the brilliancy of the iris is obscured, but its colour is not perceptibly changed. The tongue is much furred; the bowels costive; the pulse feeble. He says that his eye has been gradually getting worse for a week past. He was ordered the extract of belladonna, to be applied in the usual manner; small doses of calomel and jalap to be given at short intervals until the bowels are opened, and then to take a weak solution of salts in mint-water, with a little tincture of lavender, twice a day; twelve leeches to be applied to the eye, and a tartar-emetic plaister to the nape of the neck; with gruel diet. Four days after this, the eye was much better; the inflammation rapidly declining, and the ulcer of the cornea healing, although there is still a red vessel seen in the centre of the ulcer; the pain in the head and eye quite gone; the bowels open and regular; the tongue much improved; and the cornea clear, except in the immediate vicinity of the ulcer. No further measures were employed, except the continuance of the aperient mixture, to keep the bowels regular. In about ten days after this, he was discharged quite well.

The reasoning of this case is not quite clear, in consequence of the simultaneous employment of so many measures, of which I so much complain in the practice of others. What might have induced this I now forget; but, after making all reasonable allowance for the leeches, I think they at least can have had little to do with the relief of the case; for, if we attack such a case by depletion, we shall find that we might as well do nothing as be satisfied with that afforded by leeches; whilst that determination to the surface occasioned by the tartar-emetic ointment is much too slow to be relied on in acute cases. From what I know of such matters, I think it probable that both the one and the other had more reference to some concomitant condition, which I have not recorded, than to the eye *per se*, the affection of which was combated by attention to the prevailing disorder of function—viz. costive bowels; for, to those who may be inclined to think that the leeches, or even the tartar-emetic, exerted much influence, I may observe, that I would not advise them to place much reliance on such measures; because, if inflammation, such as occurred in this case, be combated by such, they must be instituted, as I shall have occasion to remark hereafter, in a very different form and with a much greater activity.

In relation to the foregoing case, I would also observe, that the

difficulties in dispensary practice are of a kind of which the practice in an hospital affords no example. In cases where you have any doubt, you are often *obliged* to generalize your treatment, in a manner that is wholly destructive of close reasoning; because the irregularity of the patient often affords you no reasonable chance of doing as you would desire in conducting the treatment. I have, however, of late, since the appointment of Mr. Leigh to the Dispensary, had more time to select cases, and to conduct the treatment in a manner which keeps the reasoning close, and which might be done in every case in an hospital, to the great advantage of science.

One more case I will give very briefly. A young woman, many years ago, was affected by gonorrhœal ophthalmia, having been previously subject to repeated attacks of ophthalmic inflammation of a catarrhal form. She recovered perfectly as to one eye, —the pupil of the other having become closed, under this dangerous inflammation (I mean the gonorrhœal),—by very copious blood-letting and severe salivation, under my care: but I need say no more of this part of her history, as I gave the case to Mr. Lawrence, and it will be found in his Treatise on Venereal Diseases of the Eye. This was about fourteen years ago. Since that period, she has been occasionally subject to inflammation of the eye, which has been subdued by what always appears to be the correction of the cause of these occurrences; namely, a functional disorder of the liver and bowels, the latter more particularly. She is incautious in her diet, and habitually negligent of her bowels. On all occasions, the ordinary treatment of inflammation has been first instituted; and that exclusive direction of it to the disturbed organ, on the sympathetic influence of which the inflammation appeared to depend, has been a superposition on the failure of the common anti-inflammatory treatment to arrest the inflammatory action. The only part, however, of her history, which I shall here more particularly mention, refers to an attack of a very different kind, as regarded its seat and the symptoms by which it was accompanied. She was attacked by a sort of stupor, which gradually increased to a state nearly approaching to insensibility. For this she was at first prescribed leeches behind the ears, aperients, and low diet, with some benefit; but, as she again committed imprudences in diet,—one of these being that she ate a considerable quantity of very greasy pudding,—the stupor recurred, and soon assumed the form of muttering delirium, with difficulty of breathing and

oppression of the chest, so great as to threaten a speedy and fatal termination. I was now requested, by the gentleman who was attending her, to see her. I found her in the state already described. She could not be said to be absolutely insensible; but she was roused with great difficulty; and, though I succeeded in obtaining, after repeated efforts, answers to a question or two, yet the answers were rather incoherent. Her respiration was exceedingly laborious, and with such loud crepitation as made me fear that the slightest further declension of power would be necessarily followed by suffocation. Her pulse was frequent, but neither hard nor full; the tongue brownish-yellow.

I regarded this as a mixed case. I had no idea that the real cause of the disturbance was either in the brain or chest; and the history of the case readily enough suggested the bowels; but then her bowels had been opened; and it might be the liver, or even the uterus; for, previously to this attack, she had been irregular. As for bleeding, notwithstanding the evidence of inflammatory action going on in the chest, &c. her general state seemed to indicate a debility, rendering that a very doubtful measure; and the pulse seemed to contra-indicate it. I was therefore resolved to try what freely evacuating her bowels would do; first, from my knowledge of her besetting peculiarities; and, secondly, because I had so often seen exactly the same kind of tongue in connection with loaded bowels, that I regarded the appearances on her tongue as strengthening the idea which her known peculiarities suggested. Besides this, although she had had, as I was informed, pain in the hypochondrium, and dark stools, yet both these symptoms had retired previously to my seeing her.

It was difficult, of course, to decide what organ was chiefly wrong; but I decided on ministering to the bowels, for the reasons which I have stated, and also because I knew that, if I acted on the bowels, I should be more certain of exciting the liver through them, if the liver were the part now wrong, than I should be if I excited the bowels by remedies solely directed to the liver, should my supposition prove the correct one. I therefore gave her continued and graduated doses of aperient medicines, combined with enemata of warm water. She had also a tartar emetic plaister applied to her chest. The measures addressed to her bowels produced copious evacuations; her tongue began to clean; the oppression of the chest subsided; and she got well without any further measures, except substituting, for the copious evacuation of the bowels, such

modified means as procured the daily regularity of their functions.

I could go on relating cases of this kind; that is, of inflammation and inflammatory action subdued by striking at the root of their causation, both where the usual treatment had failed, and where it had not been instituted.

Now I have mentioned these cases in illustration of the true principles on which inflammation should be treated; that is, by enquiring into those states of the body generally, or that of particular organs, which are competent to produce inflammation by determining blood to other parts, in conformity with that power of which the phenomena of sympathy demonstrates the existence. In relieving the function of any organ labouring under inflammation, where we cannot strictly give it rest, a due regard to those organs which may hold a general sympathy with it, or a particular one in community or concurrence of function, will be of great service to you. In this way, you may relieve the skin by the kidney, or kidney by the skin; or the lungs by the skin; the stomach by the liver or skin; or *vice versâ*, as has been already dwelt on in connection with "Sympathy." All these principles require peculiar plans in particular cases, and involve a very close examination both as to the previous history of the patient and as to any indisposition under which he may have laboured, however trifling, especially if he can tell you what happened in regard to any organ when he became relieved. I admit this to be laborious; but there is no royal road to the interpretation of nature. Her operations must be studied to be understood; and nothing is more important than the recollection that the *seat* of inflammation may be in one organ whilst its *cause* is in another. A man who examines a piece of mechanism is often obliged to spend much time before he can discover the cause of its imperfection; and how can we expect that a rapid survey of a few minutes can suffice to ascertain the condition of so complicated a machine as the human body. You may be assured it is impracticable: there is no trickery in real science: and, although an assumption of quickness may deceive the many into an idea of the talents of an individual,—yet that pretension to celerity of decision in many cases of inflammation is not only inconsistent with any chance of discovering the causes of the malady, but it is the merest quackery, which a very little sound knowledge, instead of the trash taught them by empiricism, would enable the public to meet by its just reward.

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To return to our subject: I must now observe that the treatment of inflammation, with a view to the discovery and removal of the real cause of the malady, is yet in its infancy; and a number of circumstances oblige us to substitute other and more ordinary modes of proceeding. These circumstances are chiefly as follow: In practice, and especially in public practice—the only sufficient field commonly afforded to any one individual for investigations into the nature of disease,—we are often called on to treat a case when the inflammation has become so established that it is already threatening the destruction of the organ, as in the eye, or the life of the individual through the suspension of the functions of some organ essential to vitality.

Then again, in other cases, there may be either no circumstances which point with sufficient clearness to the real cause of the malady to enable us to see, with any approximation to certainty, the organ or organs to which this cause may refer; and, again, such circumstances may really be afforded to us, and yet a reasonable caution may induce us to discard any hope in correcting the functions to which they may refer with sufficient celerity; for active inflammation, once established in organs important to life, must be checked with promptitude, or the patient's life will be subjected to unnecessary danger, or be sacrificed.

These and similar considerations, and especially in the actual state of medical science, oblige us to consider by what other means, of a more prompt or general kind, we can stop vehement inflammation in particular parts or organs; and this leads us at once to what I may call the common mode of treating inflammation: that is, by bleeding, and various other modes of evacuation; by blistering, and other modes of counter-irritation; and by certain other remedies which either equalize or reduce general action; as tartar emetic, mercury, &c. But I will again repeat, that, if the essential law and particular conditions of inflammation be an *attempt*, in its healthy manifestation more or less successful, to determine to the surface, it implies the necessity of partial circulation seen in the necessary congestion of the inflamed part; it follows that whatever our measures may be, whether one or one hundred, whether prescribed on scientific principles or merely at the suggestion of the wildest empiricism,—yet, if they do good, they should be either explicable on principles in harmony with such views, or they should be at least explicable on none which essentially controvert them. In other words, they ought to be demonstrably calculated to equalize

the circulation, or to determine inflammation to the surface, or both in conjunction, so far as regards the inflamed part. Now, if I mistake not, a careful view of the measures about to be discussed will not only elicit a beautiful harmony in all the foregoing matters, but will even explain satisfactorily the actions of remedies, which, although perhaps of all the most potent, are those whose actions have been hitherto only guessed at, or not at all understood.

EVACUATION OF THE BOWELS.

In all cases whatever, supposing that not to have been previously satisfactorily accomplished, I have already told you to begin by evacuating the bowels; but I need not repeat more of what has been already observed on this subject. Acting on the bowels, with a view to make them accessories to the general plan of depletion, is another matter, which will be spoken of as we proceed: and now I will suppose the case urgent, and begin by discussing the abstraction of blood.

BLEEDING.

There is no remedy employed by physicians or surgeons which requires more judgment than the abstraction of blood; nor any which has been employed with less discretion. The results of accidental injuries, and occasionally those of operations, shew that the resources of the animal œconomy enable it to sustain the loss of moderate, and in some cases even considerable, quantities of blood with impunity; or, if it produce mischievous consequences, that these are in many cases prospective; so that, until lately, the connection between the loss of blood, and the effects which have resulted from it, have been altogether unobserved. We bleed in various diseases with different intentions; the only thing generally true, being that we bleed very often without any real necessity for this proceeding. But I am not alluding, at present, to any other class of cases than those in which active inflammation is present, and only to a certain class of these. Now I shall suppose that you have a case in which you had no opportunity of observing the commencement; inflammation has occurred; you only know the habits of the patient by report; the thing clear to you is, that

the inflammation is established in some important part; the symptoms inform you that it is rapidly progressing. However desirous you may be of testing some remote cause as the *real* excitant of the inflammation, the present state of science does not allow you sufficient confidence to act on any suggestion of this kind which the case may offer, nor the pressing nature of the symptoms sufficient time. In short, it appears to you that the patient's safety is inconsistent with the further progress of inflammation; that this must be arrested; and, on consideration of all points, you determine that bleeding is necessary. Be clear then, in such a case, as to your object, and you will not fail to fulfil it with sufficient promptitude and energy. This object is to diminish the action of the heart and arteries generally, and, through this, that of the vessels in the part inflamed. In doing this, you are to regard the effect you are desirous of producing, and not to be thinking of the number of ounces which any preconceived notion may induce you to consider as safe or necessary.

It is, however, quite consistent with this singleness of object to remember that the blood is an important fluid; and that, whilst you are only to be satisfied by reduction of action, yet you must effect this in such a manner as not to render the abstraction of blood larger than necessary.

In accomplishing this, we find that two circumstances are especially convenient; first, the *quick* abstraction of the blood, by which the system is much sooner affected than when drawn slowly; and, secondly, a position which also favors the early production of fainting, or a state approaching thereto. We bleed, therefore, from a large orifice, having previously raised the patient's head to the upright position. Having opened a vein, you allow the blood to flow rapidly until your patient is about to faint, or very nearly approaches that condition. This state will be characterized by the pulse becoming soft and compressible, and by its beating more feebly; the patient gets pale; perhaps heaves a sigh; the eyes will lose their lustre; and a dewy *perspiration* will break out on the face and forehead. This is the state you desire. Sometimes a patient will very suddenly faint; but, if immediately laid in the horizontal position, he soon recovers. Others will again tell you, when the symptoms which I have mentioned supervene, that "they are going;" but, if you draw the blood quickly, and the case be proper for bleeding at all, you need never be under any apprehension. But, if you draw the blood slowly, or whilst a patient is

lying down, bleeding him until he faints, or until he approached that state even in the manner which I have described, might very probably prove fatal to him. In different cases, you are told to bleed according to the constitution of the patient; that is, if he be weak, you are to bleed to so many ounces; in other cases, to so many more; and, in the plethoric and strong, in the manner which has been described.

Now I should be sorry to risk, or even to appear to be guilty of, hasty generalization; but still I must tell you the result of my experience: and although, therefore, I am far from saying that, in some cases, the abstraction of *given* quantities of blood may not be judiciously prescribed, yet, in a case of *active inflammation*, such as I have supposed at the commencement of this chapter, I do not believe that there is one case in a thousand in which you may not bleed most effectually, most safely, and with most œconomy too, in the manner directed. My conviction is, that all that has been said about ounces, applies to cases of altogether a different kind, or cases in which, if they be inflammation, no bleeding at all is necessary; and that a merit has been ascribed to bleeding which it does not deserve. In active inflammation such bleedings appear altogether bad practice; unless, indeed, as not unfrequently happens, from a large orifice, they produce reduction of power. From a small orifice, or by repeated bleedings, patients will sometimes bear, without any material reduction of action, a loss of blood which, taken at once, would produce fainting in the strongest man that ever lived; so that, to suppose that the abstraction of a smaller quantity than that necessary to produce the impression I have described, is a real œconomy of the blood, is a serious error. Besides this, the abstraction of small quantities of blood, or I should rather say *definite* quantities, without reference to the effects which we wish to produce, is often mischievous, in consequence of the excitement and reaction which it produces,—a fact with which very few, who have had much experience, can fail to be familiar.

I cannot safely adduce any appearance of the blood as guiding you in conducting this remedy. The usual appearances supposed to characterize the blood in inflammation, are its surface presenting more or less of a hollow when coagulated (technically, cupped), and a stratum of dirty-yellowish lymph on its surface (buffed or buffy coat), either separately or in conjunction: but whilst neither of these appearances are constant in inflammation, they occur

where inflammation is not present. They are presented also in cases where large quantities of blood have been drawn, when they had not accompanied the first bleeding. They can, in fact, be regarded neither as evidence of the presence of inflammation, nor as demonstrations of the propriety of blood-letting.

When you bleed then in inflammation, you do it to subdue vascular actions generally; and, through this, those of the part affected in particular. It is highly probable that other effects, even more directly bearing on the disease, are produced by such bleeding; for it is very common to perceive determination to the surface follow immediately on its employment. Thus, perspiration and secretion from various organs very commonly follow on the abstraction of blood in severe cases of inflammation; thus it is well known that the abstraction of blood is frequently followed by effects which we endeavour to produce by other remedies.

The peculiar effects of mercury are known to be produced more quickly in many cases where bleeding is superadded; and in cases not of an inflammatory nature, and in those which are accompanied by inflammation at the surface, the abstraction of blood often hastens the disappearance of the local disturbances. But the objection in such cases to bleeding, is that it is unnecessary, and strikes not at the real causes of the disorder.

At one time I used to bleed in order to assist in the correction of intractable cases of disordered secretions, and in cases of various affections of the surface, not *usually included* in our ideas of inflammation: but experience has convinced me that the bleeding is not only unnecessary, but that it is not even more quick in regard to the local manifestations in such cases than other more scientific modes of proceeding. I mean that superaddition to attention to the general health which directs it to the organ especially in fault, and which enforces it through the agency of the sympathies.

Notwithstanding, therefore, that bleeding may not produce its controlling effect in inflammation wholly by subduction of action, yet this is the only sure indication on which we can rely for benefit from that remedy; for, in regard to any other effects, it is not only uncertain, but seems generally inferior to many other modes of proceeding. I have already observed largely on this remedy; and this I need not repeat.

As there are two kinds of blood in the body, reflection might naturally suggest that some difference might occur, accordingly as the blood abstracted was venous or arterial. I am not aware that

we have any thing very satisfactory on this subject. We cannot perceive that the abstraction of arterial blood possesses any advantage; whilst, as the object is always to reduce action rather than power, the venous blood may be reasonably regarded as more perfectly fulfilling this indication; since, as regards action, it is equally efficient; whilst, in reference to power, venous blood may be regarded as less a loss, *cæteris paribus*, than arterial, in that it is not fitted for the purposes of circulation until it has undergone a change, which shews that it contains considerable quantities of excrementitious matter. With regard to the manner in which bleeding should be conducted, I consider it is by no means unworthy of more precise directions than are generally given; for the result of neglect in this particular, is, that very few people bleed properly, still fewer well: but I regard this as more properly connected with the consideration of "consequences arising from venæsection," of which I may speak hereafter.

Regarding then what is stated in this section, with what has been before observed on the subject of bleeding in inflammation, you will perceive that, with the implied exception, I consider bleeding as any thing but the best remedy in inflammation; that, for the reasons assigned in a previous chapter, it does not minister necessarily to the causes of inflammation; since it often fails in subduing it; and inflammation is often subdued without it; and that, when successful, it is hardly ever trusted to singly.

That the causes of inflammation cannot be referred to the quantity of blood, but to its unequal distribution; and that bleeding has no direct tendency to alter this state but by subduing actions of all parts, and thus making the whole suffer for the part. That its necessity, even in the present state of our knowledge, is only indicated in cases where this necessity results,—first, rather from the advanced period at which we see the case, than from its intrinsic nature: or,

Secondly, from the fact that, the real causes of the inflammation being undiscoverable, we are called on to stop it at all hazards, and by any means.

That such causes may in general be discovered, and that they have hitherto escaped detection from the absence of sufficiently enlarged and correct views of inflammation, and from the real principle on which bleeding acts not having been sufficiently considered, or altogether overlooked.

That the loss of a considerable quantity of blood may, in many cases, as is proved in accidents, be borne with apparent impunity as regards its more immediate consequences; and that there is reason to believe that this impunity may have been really the explanation of many cases wherein men have attributed advantage to blood-letting.

Notwithstanding the foregoing, as regards the more immediate effects of loss of blood, that its prospective effects are often demonstrably injurious.

That these effects are various and puzzling conditions of the circulation, chiefly characterized by determinations to particular parts; great disorder of the nervous system, simulating those which take place from plethoric conditions of the body,—phenomena which will hereafter be more particularly considered in relation to the cases in which they occur.

That Nature bleeds only under coercion; and that, therefore, bleeding is not a remedy which can be strictly regarded as one of those which can be included under the head of healthy preservative function.

That a more true view of natural bleeding, is that which regards it as disease,—that is, as a substitute for more healthy preservative action from which Nature is prevented, or to which the powers of the œconomy are unequal,—just as inflammation is a substitute for those preservative actions, which, in more healthy states of the œconomy, are undertaken by secreting, or more commonly excreting, organs.

That bleeding in inflammation, therefore, should be even already restricted to cases—

First, where we cannot discover the real cause of the inflammation;

Secondly, where the inflammation is already so advanced that the threatened destruction of life, or a particular organ, renders any further progress of it unsafe;

Thirdly, in cases which, though less severe or urgent, other measures prove ineffectual in the equalization of the circulation (very rare);

Fourthly, in such states of decided plethora,—that this condition itself may, independently of disturbance of particular organs, be regarded as the predisposing cause of the inflammation (in my experience, rare also);

Lastly, in cases where the patient, either demonstrably, or with a reasonable probability, cannot be depended on for the observance of treatment prescribed (cases not very uncommon).

In concluding this section, I would apprise you that it is impossible to include all I would say in relation to this important subject: it requires many cases, and of *apparently* very different kinds, for its full illustration: and, further, that I expect much difference of opinion on this subject; for nothing astounds some men more than the announcement, that bleeding is not the best remedy for inflammation. I can only say that I have bestowed much reflection on this subject; that I have no preconceived notions in regard to it; that I have bled as largely as any body; and that I continue still to do so in certain cases; but that where I now bleed one patient, I used to bleed perhaps twenty; and that the difference in practice has not only satisfied me with the superiority of the more measured employment of this remedy, but that it has led me to a more enlarged and true perception of the real nature of various affections, than I could have attained had my investigations been obscured by the employment of bleeding in its ordinary frequency. On this, however, as on all other questions, I only wish that the subject should be fairly and patiently considered: my object is truth, not the support of any particular opinion. I must also observe—

That organic diseases of the heart, or lungs especially, will materially modify any observations that can be made in connection with the *general* consideration of blood-letting; but as these will have reference to various circumstances affecting both the kind and nature of the disease, and the various concomitant conditions of the œconomy, they can only be considered properly in connection with such diseases.

I have already observed that bleeding is frequently followed by determination to the surface, by means of the skin or some other secretion; and I may add, that when it does good, it is almost invariably followed by some such manifestation. But, although this is in harmony with the real nature of inflammation, as is that equalization of the circulation effected through a general reduction of all vascular actions in common; yet it is, in the *generality* of cases, a method much less uniformly certain than some others; whilst, as regards the powers of the œconomy, it is by much the most expensive of all. I say nothing with regard to the repetition of blood-letting, since this will be determined by the same consi-

derations which led to its primary employment. In estimating the truth of the foregoing remarks, I must guard you from drawing conclusions from cases wherein bleeding has been employed *simultaneously* with other remedies; especially if, as generally happens, these be such as experience demonstrates to have great power in the control or removal of inflammation.

LOCAL BLEEDING.

I have already adverted to the principle on which local bleeding appears to act in contributing to the reduction of inflammation. I have endeavoured to shew, that, in the ordinary employment of it, this principle is different from that of general blood-letting; but that, like it, it ministers to the effect, rather than the cause of the malady. Local bleeding, I mean in regard to active inflammation, has been usually employed—1st, where general bleeding has been carried so far as the powers of the patient appear to justify, without the subduction of the inflammation: 2ndly, where, though the powers of the patient have not been subjected to any previous *general* abstraction of blood, they are regarded as already unfitted for its employment; this being especially the case where organs are previously diseased: 3rdly, in cases where the inflammation is seen at a very early stage, where we have reason to believe it to be very slight, or even its existence doubtful: and, lastly, in inflammation on the surface of the body; which last will be more particularly spoken of when the diseases to which they refer are treated of under the names by which they are conventionally designated.

The modes adopted for local bleeding, are the application of leeches or cupping; for opening the jugular vein or temporal artery, though instituted with certain views to the locality of the inflammation, does not range itself properly under the head of local bleeding. So indeed in regard to leeches and cupping; it is quite possible to institute either of these measures in a manner which refers their operation to the general, and not to the local, abstraction of blood. But I speak of them as commonly employed.

In general, I think cupping is to be preferred to leeches as a mode of *local* depletion. We know the quantity we take; which, as we here bleed on a different principle, is important; secondly, we obtain the blood more quickly, and independently of the vessels actually opened, we powerfully determine the blood to the surface over

which the cupping-glasses are applied. This is a great advantage, and is seen in dry cupping, that is, where the glasses are applied without the infliction of any wound,—a mode of proceeding by no means so extensively employed on the *human* body as it ought to be, although its general utility is, I believe, not to be questioned. The truth is, that it determines to the surface without reduction of power,—a very desirable combination. To obtain benefit, however, the glasses should be applied for a considerable time; but I shall have occasion to enlarge on this subject hereafter. Another advantage of cupping over leeches, is, the avoidance of that exposure to cold which is almost unavoidable in regard to the application of leeches; and which, in *many* cases, it is especially desirable to avoid. Leeches are often, too, very fatiguing to the patient.

Where local bleeding is judged necessary, leeches, however, are occasionally convenient, and especially applicable to external inflammation when the skin is tense and tender, and when the cupping-glasses could not be either conveniently applied, or not without the creation of additional excitement, as in severe cases of erysipelas, for example.

The action of local bleeding is clearly, in many cases, the same as general bleeding; but this has been spoken of; and in certain cases, such as inflammation of large surfaces, attended by already reduced powers, the endeavour to produce general effect by local bleeding may combine the advantages of both modes of proceeding: in this case we apply four or five dozen leeches at once.

If you apply leeches in children, that is, of three or four years old (and if younger, the caution is the more necessary), you should be aware that it is by no means safe to allow them to bleed indefinitely; for even two or three leeches, or even one, in infants, may possibly be followed by so large a loss of blood as to prove fatal. I make no apology for impressing this, because, to my surprise, I have found that some of the profession are not sufficiently aware of this fact.

I was once called to the child of a physician, who was already pale and exsanguious from the application of three leeches, and who would have died, I am convinced, had the bleeding not been promptly arrested. Another medical man, otherwise exceedingly well informed, told me, as an extraordinary fact, that he had nearly lost a child from the application of a few leeches.

Many years ago, a patient whom I attended myself, in con-

sultation, was very nearly dying from the application of three leeches. The necessary caution had been given, and the bleeding stopped. The child, however, being restless, had, in moving about, rubbed off the lint; and the mother, alarmed at the dying appearance of the child, removed the bed-clothes, and found that there had been a vast loss of blood. The child rallied, however, from this; but it is worthy of remark that she ultimately died of the inflammation.

Leech-bites in very young children, therefore, should only be allowed to bleed for half an hour or an hour, according to the number which have been applied, and the circumstances of the case. They are easily stopped by a double fold of lint, and a little flour placed by the finger on the part, and held there till it adheres. The foregoing case will also suggest the expediency (the child being in bed) of securing the lint for a time on the part by a slip of plaster, or some similar expedient.

Local bleeding, then, where it is not employed as general bleeding, opposes congestion of the part, the necessary element of inflammation, and thus affords more time for the effect of other and more important remedies which may be in simultaneous operation, in cases where bleeding is at all necessary. Again, it determines to the surface, and that nearest to the inflamed part; between which and such part there is, as formerly shewn, great sympathy. Cupping evidently produces such determination in a very marked manner; whilst the openings on the surface, made in common by cupping and leeches, may increase this determination on the hydraulic considerations already mentioned*.

PURGING.

The too prevalent idea, that the most powerful agent in inflammation is depletion, has naturally led men to effect this, in various cases, by that indirect method afforded by the excitement of various secretions; and the large surface of the alimentary canal has been frequently rendered contributory to this purpose.

I have already spoken of the absolute necessity of emptying this canal of its contents, and the reasons on which we ground this necessity.

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* See page 310.

Certain advantages are often obtained by following up such evacuations of *contained* matters by the subsequent promotion of increased secretion from the mucous surface; and the best mode of effecting this is by giving small doses of saline purgatives, to which minute portions, as one eighth of a grain, of tartrate of antimony may be added with benefit. The advantage derived from this source depends on different circumstances in different cases. Sometimes alimentary disturbance is the *real* cause on which the inflammation depends; and, in such cases, the excitement of secretion (especially if pain or other indications of undue excitement be avoided) tends to relieve disturbance in a natural manner; that is, by secretion. Besides, purging is not only in itself a determination to the surface, but, by the sympathy of the bowels with the skin, it often produces determination to the latter organ—a thing, in a general sense, much more important.

In other cases, again, aperient medicines appear to produce benefit by creating powerful determinations to a surface distinct from that which is inflamed; and thus oppose congestion (the necessary element of inflammation), *quoad* the inflamed part. In this case, they appear to produce benefit on the same principle as that on which counter-irritants do (as blisters, &c.) when applied to the skin.

In certain cases, also, where the inflammation is not very urgent, and where the disorder of the system seems to depend on a general plethora, rather than on any disorder of a particular organ, purges reduce the circulating fluids by means of the secretions, which is found not to disturb or reduce the general *power* of the œconomy prospectively, so much as direct depletion.

Purges, therefore, evidently address themselves to the real causes of inflammation; first, in determining to the surface absolutely; secondly, in determining the blood from the inflamed part, and thus, in regard to it, equalizing the circulation; and, thirdly, in cases suggesting its expediency, they are indirect modes of depletion.

In affections of the bowels themselves, the excitement of their secretions would be of all things perhaps desirable, could we accomplish it. But here purgatives are of very equivocal advantage. I speak thus cautiously, because my experience on this part of the subject is chiefly drawn from inflammation, as it occurs in connection with strangulated hernia, in which I feel certain that purgatives are seldom attended with benefit; whilst I am equally convinced that they have often been highly injurious; and, in some

instances, I am satisfied that the excitement and disturbance which they create has been the *cause* of the inflammation in such cases, as I hope hereafter to be able to shew.

Notwithstanding, therefore, that purging is advantageous, and in the different modes which I have mentioned, and probably in some cases in all of these modes,—still we cannot say that practice justifies our placing the same reliance on it in severe and urgent cases as we can on other remedies,—I mean regarded as remedies of *general* application in such cases; and, as to the excitement of secretion from the bowels, we find that, in many cases, we are obliged to keep this within very confined limits; as much action here vitiates the power of one of our really most potential measures. These I will now consider; repeating only that I speak of purgatives in their *general application*, and not with relation to those cases in which certain disturbances of these viscera are, through the agency of their sympathetic influence, the cause of the inflammatory determination to the inflamed part.

We find that general reduction of action and power will by no means always subdue inflammation; and this remark applies to bleeding with at least the same force and truth as it does to any other mode of effecting such reduction. We learn this by the direct experience, that the most severe abstraction of blood will by no means, in every case, effect the object we desire; and that, although practitioners in general place greater reliance on bleeding than on any other measure singly considered,—yet they scarcely ever trust its single influence.

Further, we find that the existence of inflammation of the most dangerous kind is by no means inconsistent with exceedingly reduced power; since we observe this combination in cases where no means have been instituted for reducing the powers or actions of the system; but, so far from such cases being favourably influenced by such a combination, they are, under the present modes of treatment, of all others the most dangerous and unmanageable. These cases oblige us to attempt the relief of inflammation by other means, which may reduce the actions of the system without diminishing its power; and, whilst they involve problems alike difficult to physicians and surgeons, impel us to endeavour at improved modes of practice, in the doubt, which they naturally suggest, whether a practice which evidently consists for the most part of ministering to symptoms or effects can be the scientific, true, or natural mode of treating these dangerous disorders of the animal

œconomy. Besides, if those inflammations be really the most dangerous or intractable, which are characterized by simultaneous prostration of power—and it is notorious that they are so—the idea naturally occurs, that, where bleeding does not effect its object, it may be exceedingly injurious.

There is no mode of meeting these difficulties but by a more enlarged enquiry into the real causes of the malady; and by testing the influence of these causes by acting on our supposed discovery, in cases where such discovery seems the result of a reasonable induction, from the facts previously ascertained, and the relations which they bear to any known laws of the animal œconomy. The manner in which this should be done I have endeavoured to explain, both generally, in the investigation (see Discourse II), and also in cases of inflammation in particular.

I say, then, that other remedies than bleeding, even when this has been liberally employed, are found necessary; and endeavours are made to reduce the inflammatory actions by other and less expensive measures as regards the expenditure of vital power. The means employed with this view are various; but one of the most potent and most frequently employed is the tartrate of antimony. The phenomena observed during the administration of this remedy are not in every case the same. Generally, we observe the stomach affected by nausea; sometimes sickness; and secretion takes place either from the skin, bowels, or kidney; and sometimes from all of these organs, but the skin especially. We observe also that there is considerable diminution of force in the action of the heart and arteries, the pulse usually also becoming softer. We thus obtain a diminution of vascular action and an increase of secretion, and especially in an organ (the skin) which determines to the surface, or of which the ordinary functions are emphatically the separation of excrementitious matters.

In different cases, different organs are effected; and even where all these which I have mentioned are excited, one of them is commonly more active than the others, and this will vary in different persons. In a case already mentioned, a small dose of tartrate of antimony appeared to have affected the skin in some degree, the bowels very profusely, and the kidney not at all. These differences occur, in some degree, in endless shades of diversity; but the skin is almost always more or less affected, except when the remedy proves entirely inert, which happens but seldom.

In particular cases, good effects may result from the remedy

acting on particular organs, in conformity with what I have observed as to the causes of inflammation; but, for the most part, the parts which we are most desirous of influencing are the stomach, skin, and the heart and arteries. Practically, we find that the best mode of accomplishing these objects is to prescribe the remedy in such doses as shall produce and maintain a state of nausea of the stomach; and the phenomena of sympathy shew us that this condition, be it obtained how it may, always produces perspiration, with a depression of the action of the heart and arteries. We therefore give one half, one fourth, or even one sixth or one eighth of a grain, every two or three hours; at least these are the doses most commonly employed in this country. When we give larger doses than these, it is usually in combination with calomel or opium, or both—remedies of which I shall speak presently. On the continent, however, much larger doses than these are commonly administered. I do not know that any advantage is derived from such doses (which vary from several grains, even in some cases, I believe, to a scruple or more at a dose), so long as vomiting is to be avoided; and, although vomiting in particular cases is useful, yet this is not the general intention, nor the most desirable thing: continued nausea, and the sympathetic affection consequent on it in the maintained determination to the surface, and reduction of the heart's action, is the thing we seek; and, in this view, the smaller doses given, at shorter or longer intervals, are alone necessary; indeed they appear to answer the intention most successfully.

I do not regard the plan of combining this remedy with calomel and opium as good practice; I do not say that it may not answer in particular cases; but generally opium does not, I think, assist the tartrate of antimony; whilst the latter has rather a tendency to interfere with the effects of opium. It is better to give the tartrate of antimony first, and then proceed to the calomel and opium, should the case require it; or, if it be very urgent, to begin with the calomel and opium, omitting the tartrate of antimony. I do not wish you, however, to understand me as putting much stress on *this* difference of plan; I only tell you my own practice. The tartrate of antimony is a very powerful and efficient remedy; and it is only in severe or neglected cases, or cases in which some particular organ is affected, that calomel and opium become necessary; but, in all urgent cases, where we have little time, it is of the first consequence not to delay this remedy.

The effects which I have described as resulting from tartrate of antimony may be occasionally obtained from other remedies. Thus, small doses of ipecacuanha, jalap, or any substances which produce nausea, will, with greater or less degree, lower the action of the heart and arteries, and determine to the skin or some other organ; and these may be given in combination with opium, henbane, digitalis, camphor, and many other things. Tobacco has also a remarkable power in lowering the action of the heart, and producing nausea and perspiration; but this, and remedies of a like nature, are too dangerous to be commonly admissible, and uncertain in their *mode* of action: therefore, although it is useful to know of them, and especially, more than all, to understand the common principle on which they seem to act, to meet cases of emergency, or when other means may not be at hand, still the tartrate of antimony is the remedy to be preferred in obtaining the objects which I have mentioned.

You see, then, that the action of the remedy is to excite nausea, to determine to the surface, and to do what always follows these circumstances—lower the action of the heart and arteries. This is combining all the elements of good treatment. The determination to the surface tends to disturb the condition essential to inflammation; viz. congestion elsewhere; and this in a manner exactly in conformity with Nature's own processes, as has, I trust, been sufficiently shewn; whilst the reduction of arterial action is also accomplished.

The conditions of serious inflammation—viz. general increase of action, with particular increase and congestion in a part—become thus reversed, in that the general action becomes diminished, with particular determination to the whole surface of the body. This, whether evinced by secretion or irritation, is a great gain; generally, in a practical sense, curative in both cases.

As I shall revert, in the sequel, to the tartrate of antimony, in common with other measures, I need say no more on its practical administration.

OF MEASURES APPLIED TO THE SURFACE OF THE BODY,—BLISTERS, ISSUES, SETONS, VAPOUR AND WARM BATH, ETC.

You have already seen that the various measures of which I have spoken involve, practically, attempts at equalizing the circulation;

and this chiefly by determining the blood *from* parts labouring under inflammation, and chiefly *to* the surface of the body. Now, amongst the *ordinary* remedies for inflammation, and those which, in many cases, exert great power in its subduction, we include the application of blisters and issues, setons, certain substances which produce irritation in another way, as the ointment of tartrate of antimony, and those which merely excite the part to which they are applied by making it red, determining the blood there, in fact, and which have been simply termed rubefacients. Of these last, any stimulating substance is an example; mustard, applied in various forms, being the most powerful. All these remedies are included in the term "counter-irritants:" they were also said to act by revulsion and derivation; the latter, though an old term, expressing their real mode of action perhaps most perfectly. Now they all appear to act on the same principle; the obvious phenomena to which they give rise being, first, a determination of blood to the part to which they are applied (the surface of the body), and the superinduction of inflammation, effusion either of serum or pus, according to the remedy or the duration of its application. A blister produces determination of blood to the surface; then inflammation; then little blisters, whence its name; and, lastly, secretion of matter, which we either continue to excite by sustaining the irritation, or not, according to circumstances. The ointment of tartrate of antimony produces suppuration, in the form of little pustules, which, discharging their contents, either heal, like all other little abscesses (which pustules are), or go on to ulceration, *accordingly as we withdraw or continue the cause of their production.*

You see how exactly this is in harmony with what I have already observed in regard to ulceration. Setons and issues produce suppuration by a continuance of the original causes of the inflammation; and, when these are removed, they both heal.

We make an issue generally by destroying a piece of skin, by means of caustic. This (generally the caustic potash) is pounded in a mortar and mixed with soap; a piece of double plaster, with a hole cut in it, somewhat less than the size we intend the issue to be, is laid on the part; over this hole we spread the paste so prepared; and then we press the sides of the hole close to the skin by a cylinder of linen or anything at hand, securing it by straps of plaster: we allow it to stay on for about five hours. When we find a piece of skin destroyed, we poultice the part; the deadened skin is thrown off; and, if we wish the issue to be maintained, we put a

string of glass beads in its circumference, to prevent its healing; and then either dress it with simple spermaceti ointment, or some of a more irritating kind, as we feel satisfied with the irritation produced, or as we wish to increase it: the latter is seldom necessary. When we wish the part to heal, we simply remove the impediment (that is, the beads), when the wound becomes repaired in the usual manner.

A seton is made by simply gathering up a portion of skin, and conveying through it either a skein of white silk or a piece of tape, by means of a lancet-shape knife with an eye, through which the silk or tape is previously introduced (technically called a seton-needle); and, having thus introduced it, we allow it to remain, contenting ourselves with the irritation and suppuration which, as a foreign body, it produces, or increasing them by conveying irritating applications to the part. When we wish all these processes to cease, we simply remove the cause; that is, the tape or silk, as the case may be. Sometimes Nature, if not counteracted, will throw off both the seton by removing the skin covering it, and the issue by pushing out the beads, by means of the formation of granulations beneath them; all which is highly interesting, and often affording hints of great value, as you will see when particular diseases are considered.

In active inflammations, however, it becomes very important that we should produce this determination to the surface, which all these means effect in common, by those which will do it in the shortest possible time. Hence it is that blisters are, of all other means, most effectual; whilst they allow us to maintain the irritation just as easily as any of the others. Mustard, boiling water, concentrated mineral acids, and a number of other things, will accomplish this object; but the best and safest mode in practice is to apply the Spanish fly, previously comminuted, and mixed in the form of an ointment or plaster. This is usually applied on the surface, opposite the part in which we believe the inflammation to be seated; as on the chest, in various affections of the lungs; on various parts of the abdomen, in the affections of the different viscera contained in it; in inflammation of joints, either on or near the skin covering them; and so on.

There are some remarks and cautions, in respect to blisters, which must be mentioned. In the first place, we find that, in many cases, they seem to produce most good when we have previously checked, at least in some degree, the inflammatory

action: and, in regard to joints, Mr. Abernethy used to forbid their employment until this had been, in some measure, fulfilled. More particular directions, in this part of the treatment of joints, belong to the local treatment of such affections; but I may observe here, that the main consideration refers to the contiguity of the blister to the part inflamed.

There seems good reason for caution in this respect. If a blister be applied over a part in an active state of inflammation, it certainly does, in some cases, communicate excitement to the part inflamed; but never, that I know of, when applied in the *vicinity*. That this is the true explanation, appears probable, from such effects being most common in respect to joints, between which and the skin scarcely anything but cellular tissue intervenes; and affections of the eye, most of which, as I have observed, occur on a surface continuous with the skin. Indeed, in the eye, we for the most part act on such a view of the matter, and apply our counter-irritants behind the ears, in preference to any situation more contiguous to the organ. In fact, this excitement of inflamed parts by blisters applied to the skin over them is not very common, however, in the chest, where it does occasionally happen; whilst, in inflammations of the abdomen, so far as my experience goes, such excitement never happens as a consequence of their application.

Blisters occasionally produce irritation in the urinary organs; but this seems to result from the actual absorption of the irritating principle of the Spanish fly; for we do not find it following blisters otherwise produced: and, in respect to the fly, we prevent it pretty certainly by the interposition of a piece of silver paper, as it is called, between the blister and the part to which it is applied, though perhaps not invariably.

In children, blisters should be applied with caution; that is, they should be either very small, or only allowed to remain sufficiently long to produce vivid redness of the surface, which, though the blister be removed, is usually followed by the characteristic consequence of the application. If we allow them to remain on as long as in the adult, the inflammation excited is so violent, that, taking place in states of reduced power, of which the disease for which they are applied is either the evidence or the cause, sloughing is apt to supervene.

We have had, at different times, numerous examples of this in the Dispensary, whither children are brought, who have been recovered from the ailment for which the blister was applied, for the

relief of the sloughing; and such cases are always serious, and occasionally fatal.

The treatment consists, of course, in attention to the general functions of the body, soothing applications to the blister, a bread poultice, and such measures as are calculated to give strength to the system, consistently with the avoidance of excitement. Exceptions to the selection of blisters as counter-irritants or derivatives to the surface also are occasionally indicated in those individuals in whom this active excitement of the skin produces unusual irritation; the whole system becoming exceedingly excited and otherwise disturbed: but, in acute inflammation, this rarely happens: when it does, some other form of counter-irritation must be substituted, as the application of a mustard poultice for a short period, or some other mode of irritation. You see, however, that these remedies have alike one object—the determination of blood to the surface; since, whether we restrict our plans to this, or extend it to the production of inflammation, they are both extensions of the same process; and that they are powerful remedies in inflammation is no less deducible from the consideration of the nature of that process, and the law under which it occurs, than that they are demonstrably such as a matter of experience. But, if these considerations point so strongly to determination to the surface of the body, as being the chief object in all inflammations, so we are naturally led to see whether we cannot extend the influences, thus successful when applied to parts of the skin, to larger districts; in fact, to the whole surface of the organ. In contemplating this, however, by means of blisters, or any other mode of counter-irritation, we immediately find that inflammation of a large portion of skin is a thing just as dangerous as the inflammation of any other part, as severe burns emphatically demonstrate; so that we are led to think of milder measures. Of these, warm or vapour baths are examples; and, accordingly, we find that warm baths are occasionally of great benefit; but, in no respect, so powerful as are those of vapour.

Baths may consist either of hot air or steam, and they may be either medicated or otherwise. I have no experience of medicated vapour baths in those active forms of inflammation to which I am now referring; but of the efficacy of steam baths I have had a large experience in different cases.

As they are too expensive for public practice, I contrived a very simple apparatus for their administration, which I find perfectly

efficient; and I gave the sketch to Mr. Livermore, of Oxford-street, who makes the whole affair, I find, for nine shillings. It consists of a conveniently contrived kettle and a couple of pipes; and it answers exceedingly well.

It was this apparatus which I used in the case of influenza which I mentioned (page 198); and I will just briefly relate another example of its successful application; I attended an elderly gentleman with acute inflammation of the bladder, requiring the anti-inflammatory treatment in all its activity; and even then I had great difficulty in saving him. As his skin was very sensitive, and as he was somewhat incautious, I did not press the steam bath; besides, he rather objected to it, and I had then no experience of its effects in such a case. A few months after this, I had a similar case in the Dispensary, in a man whose employment obliged him, as soon as he could move at all, to be out at night as a watchman. He got some benefit from the usual treatment, with calomel and opium, which had also been used in the former case; but still I could not altogether relieve him under circumstances so unpropitious; and he continued to suffer a great deal of irritation, and to void large quantities of ropy, puriform mucus from his bladder: I now advised the vapour bath, and the third night it produced most profuse perspiration; the secretion of the mucus entirely ceasing in one night. This recurred in a slighter degree, and ceased again on alternation with the use of the bath, until at length it ceased altogether. I have not seen the man for some months, except once accidentally in the street; but I believe that he remains well. As he has another complaint, he will probably not remain so long, since he has not continued his attendance so that it might be completely removed; but as this malady did not trouble him, I suppose he will wait until it does, as his employment renders attendance at the Dispensary very inconvenient, and the necessary restrictions, unless they become imperative, nearly impracticable.

I may observe that an extension of this application of warmth and moisture to the surface, consists in injecting the bowels with warm water; not with a view to the evacuation of their contents, for we will suppose this to have been effected, but as extending the application of warmth and moisture to the skin,—to a surface which is continuous with it, and with which it has so lively a sympathy.

I know a gentleman who laboured under what seemed to be one form of the influenza of last winter; the chief symptoms

being pain and determination to the head, with pain and sense of constriction across the chest. Purging and sudorifics, with careful diet, did very little more than mitigate the symptoms: enemata and vapour baths were tried separately, with about the same effect. The worst night he had, and during which his head was very painful, and the skin remarkably dry, the kidney secreted spontaneously an unusual quantity of urine; still he remained in an indifferent state. I recommended him, under these circumstances, to give himself a copious enema of warm water, and immediately after a vapour bath, and then to go to bed, as he had done before. The conjoined influence of these measures threw him into a most profuse perspiration, and he arose in the morning comparatively well; and, although he was some days before he was quite recovered, yet no other measures, nor even the repetition of these, were necessary,—his attention being confined to the regulation of the bowels by the enema, and a common plain diet. There are many other points in connection with determination to the surface, produced by applications directed immediately to it; but those mentioned here are of chief consequence in active inflammation, and I cannot do more without a digression, which in this place would be improper.

OF MERCURY, AS EMPLOYED IN THE TREATMENT OF INFLAMMATION.

The advantages of employing mercury in cases of severe or dangerous inflammation, and especially in combination with some narcotic, is too familiarly known to render it necessary that I should dwell much on that circumstance merely. The most efficient form in which this remedy is administered, is the combination of calomel and opium. Other milder preparations are occasionally used, such as the blue pill in combination with the extract of henbane; and doubtless there are cases in which this form is beneficial; but I am now speaking of severe inflammations, and in such I would advise you to employ calomel and opium, in preference to any other combination of mercury with narcotics, both as being more certain, more speedy in its effects, and, prescribed in doses appropriate to the peculiarities of the case, equally safe.

The obvious power of this medicine (I speak of calomel and opium) in suspending inflammatory action, and in producing the

removal even of its products, though in many other cases a matter of tolerably safe inference, is no where so demonstrable as in the eye, where these things may be seen.

In the eye, which is still regarded by many as having something peculiar in its diseases, we not only have a beautiful and instructive microcosm, in which we may observe the various phenomena of inflammation in a manner which we can do no where else, but inflammation of this and other parts mutually reflect light on each other ; so that we can hardly arrive at enlarged and correct views of either without investigation of both classes of phenomena. Therefore, to suppose that there is any thing peculiar in diseases of the eye, as to their nature, is not only a very gross error, but a very mischievous one, and can really only be entertained by persons whom the very idea proves to be ignorant of the subject. We see, therefore, how little chance a *mere* oculist has of arriving at a correct knowledge of the diseases of that organ to which he professes to limit his attention ; since such limitation may be said in itself to exclude the possibility of his having the knowledge necessary, as I hope to shew more especially if I have to treat of the diseases of this organ.

If diseases of the eye have any thing peculiar to the pathologist, it is in the facility and clearness with which they instruct him ; for whether we regard the physical characters of inflammation, its causes, or the various conditions of the health with which they are connected, we have nothing approaching, in regard to other parts, to the clearness and unequivocal nature of the evidence afforded by diseases of the eye : and hence it follows, that, if their treatment have any thing peculiar, we must look for it simply in that facility necessarily afforded in the selection of our measures by the unusually clear manner in which we perceive the seat and nature of the disease. In the eye, then, we see the lymph deposited by inflammation becoming absorbed under the influence of mercury in a very curious and satisfactory manner, and the relation of cause and effect, with a constancy which enables us to predict the success of the measures employed with an uniformity and certainty which, though not wholly without exception, is still such as to be rarely observable in regard to medical treatment.

Now it is necessary that you should have correct notions, not only in regard to the mere fact of the absorption of lymph thus deposited, but also in regard to the principle on which it takes place; and the reasons which shew that principle to be really the

modus agendi of the remedy. As we know that the lymph is removed by the absorbents, it certainly was not an unnatural supposition to refer the action of the mercury to some *direct* influence which is exerted on the vessels; but a little consideration will shew you that this view of the matter is erroneous, and points out in the sequel how important the perception that it is so. Now the absorption of deposited matter depends on the arrest of inflammation; the actions leading to such depositions ceasing, the deposited matters are removed, as being unnecessary or noxious. If I break up a cataractic lens, and take care to prevent inflammation, the lens becomes absorbed without any remedy whatever.

Again, in the cornea of the eye we observe very considerable opacity, consequent on inflammation becoming renewed, when the inflammation has been thoroughly checked in due time, although no mercury may have been employed. The thickening of parts is also pretty generally removed when the inflammation has been stopped in reasonable time, and without any employment of mercury. In fact, the inflammation having been subdued, we actually find that the absorption of thickened parts is rather expedited by friction and other measures, which would rather excite the vessels than otherwise; shewing that the presence of inflammation is the real obstacle to absorption, and that nothing short of it is necessarily preventive of such absorption.

I recollect a very interesting case, in which a very considerable opacity of the cornea became removed in consequence of a fresh attack of inflammation; the cornea, in the situation of the opacity, going into ulceration; and, on the inflammation being arrested, the ulceration healing without any opacity at all. A circumstance which has favoured the erroneous idea that mercury acts by some specific power on the absorbents, is the emaciation, greater or less in different cases, attendant on the administration of this mineral. But this is easily explicable on other grounds:— in the first place, the cases always imply a very scanty diet; the effect of mercury thus given, is to impair, in a greater or less degree, the functions of the digestive organs; whilst secretion, especially that of the skin, is increased instead of being diminished. Thus we have continued expenditure with deficient supply: but, besides this, there are very few medicines, and still fewer diseases, in the sense in which we use that term, which do not alike diminish the bulk of the body; and for two reasons,—one or both

of which apply to all diseases,—viz. the diminution of food, which is necessary; and the absence or diminution of the powers of assimilation, through which only it can be converted to nutriment.

The power, then, which mercury exerts in inflammation, is *proximately* due to the influence it exerts on the minute blood-vessels of the part, or the increased action on which the products of inflammation primarily depend; and thus, though inflammatory action ceases, the absorbents are left to the unembarrassed exercise of their natural disposition, which is to remove all depositions which are not necessary, and the causes of which have ceased to operate. But we gain very little by this step in the investigation, if we use it not as a means to a further progress in the enquiry. The interesting question is not, abstractedly, whether mercury influences the minute vessels of the part, but how it exerts this influence: and now we arrive at the really important question. Here, as in all others, we must begin by collecting facts. Now the first fact is, that mercury, made to produce those effects which I have mentioned, must be administered so as to "affect the constitution," as it is termed. What is meant by "affection of the constitution?" Why, generally, certain altered conditions of the system, which we familiarly recognize as the effects of that mineral. And what are the effects? Soreness of the mouth and salivation is one of them; and so characteristic is this, that the first question a surgeon asks, with a view to ascertain the existence of this constitutional effect, is—have you any disagreeable taste in your mouth, sir; are your gums sore? He inspects these parts; and if he see an elevated, vascular condition of the gum, he regards the constitution as affected by the mineral.

Now, practically, there is no great objection to such a test, if certain facts be remembered at the same time:—first, that in many patients this particular effect can scarcely be produced; in none, abstractedly regarded, is it necessary. Another fact is, that mercury affects the skin in an especial manner, increasing its secretions; as also, usually, those of the kidney and bowels; the pulse too becomes softer, though, so far from being less frequent, its frequency is generally increased; which is a circumstance you will bear in mind as important in this agency: for although the frequency of the pulse may be increased, we do not find that its force is increased; on the contrary, it has rather a tendency to diminution. Now, in considering these facts, in relation to mercury, the idea

first suggested, might be that it acted by a depleting influence, in that it increased the various secretions: but we very soon perceive that the idea is not tenable; because, in the first place, many remedies increase the secretions much more remarkably than mercury, without effecting any thing like so certain a control over inflammatory action.

Besides, *such* increase of secretion is so far from contributing to the good effects of mercury, that it almost certainly produces failure; and, as the bowels are the most certain channel through which mercury produces the largest depletion, we at once stop this by combining the exhibition of opium, that the mercury may not "run off by the bowels." But, in regard to the skin, we observe no such ill effects from the mercurial excitement of its secretions, and therefore we do nothing to check this: for, besides that opium, in certain doses, is actually a sudorific, we even, on many occasions, combine medicines with the mercury which have a very powerful effect on the skin as their leading character, not dreaming of vitiating the effect of the mercury thereby, unless these additional remedies affect (which they will sometimes do) the bowels, when we instantly discard them: of this the tartar-emetic is an example.

But again, it might be said, that if the mercury acts thus on the *skin*, may it not still owe its anti-inflammatory agency to depletion? There is a very simple reply to this query, which appears quite conclusive in the negative. The answer to the question regarding the influence of depletion in general, applies with the same force to the skin in particular. Since, if it were so, we should find that the benefit would be commensurate with the excitement of the skin; which is by no means the case. Many remedies produce more abundant secretion from the skin than mercury does; tartar-emetic, for example: and although such excitement is to be regarded as beneficial, yet it will not stand in the place of mercury in the cases to which this remedy especially applies.

It is the *sustained manner*, not the abundance of the matter secreted, which constitutes its essential effect, if it is to be successful. The additional force given to the action of mercury by the avoidance of all depressants at the surface, as cold, is an unanswerable argument in favor of its effects being mainly attributable to its influence on the surface of the body. Neither can we attribute the action of mercury to any general reduction of power, and through this, of the power in the inflamed part; for, besides that repair implies the necessity of at least as much power as injury

does, we find this remarkable fact—that of all secretions (the proportion being the same), the increase of that of the skin produces the least debility.

So again, of all remedies, mercury, which, to say the very least of it, yields in anti-inflammatory action to none—if, indeed, it be not superior to all others—is that which produces the least debility or depression of power. There is, in truth, no comparison in this respect, if we think of it in relation to the vigorous employment of bleeding, purging, or any other of the general measures instituted for the relief of inflammation. Therefore the conclusion seems irresistible, that mercury acts by equalizing the circulation, or by determining to the surface, which, in the majority of cases, is the same thing; and thus destroys the element essential in all inflammations whatever,—namely, unequal circulation,—that is, congestion in the part inflamed.

The consideration also of the phenomena with which inflammation commences, lends the strongest conceivable probability to this view of the action of mercury: and I allude especially to the occurrence of coldness or shivering, so constant a precursor to inflammations of external parts. Nor is it material, that, in so large a system as the whole vascular tissue of the body, inflammation of a minute spot, like the iris, for example, should occur without this previous testimony of depression at the surface having been perceived; especially when we consider, in regard to light and transient impressions, how different the nervous susceptibility of different persons is, both in regard to their abstract sensibility to impressions, and the degrees of that sympathetic vigilance between different parts on which the early recognition of disorder essentially depends*. How mercury produces this determination to the surface, is another question, and one of great interest. When we consider

* The great difference in the vigilance, so to speak, in the sympathies, is very remarkable, both of mind and body. I last year had a case of chimney-sweeper's cancer, which, when presented to me, seemed to have extended so deeply towards the pelvis, that I regarded any attempt at its removal as involving little certain but additional suffering. I told the friends of the patient that, as he would surely die without an operation, I would not hesitate to undertake its removal, provided any surgeon would say it was a feasible thing. Mr. Stanley saw it, but agreed with me that the thing was too desperate to justify a trial. His friends informed him of all this; and the man suffered great pain from the disease, and wished its removal at all hazards; but as I could not conscientiously undertake it, I declined doing so. Now, with all this, I could not but be struck with the apparent indifference of the man's mind to his situation; for it was evidently neither the result of

how often inflammation depends on remote, and, as I call them, real causes, referring to disordered condition of some one of the various viscera; and consider again the effects which mercury has on these viscera, in cases where inflammation may or may not be present; we cannot but regard the possibility that it may act on the surface by its power over some viscus on which the inflammation may depend: but then we should, I think, expect secretion from that viscus; which either does not take place, or is not perceptible in every case. Its determination to the surface might probably be more safely referred to a more *general law* in the animal œconomy. It is itself a poison, and one highly capable of injury to the animal œconomy. The slow and less exciting influence which has led to the inflammation may not have been sufficient to rouse the powers of the animal œconomy, weakened by habitually embarrassed function, and *accustomed* to some injurious influence; but a very injurious agent or poison being introduced, having an influence short of annulling natural power, excites endeavours at its expulsion; and then the œconomy does it in the natural way,—that is, by actions at the surface: which actions, equalizing the circulation, destroy the element of inflammation, as I before stated (congestion); and *that thus, after all, the effects of mercury may in fact be only those exerted by many other substances, injurious or poisonous to the animal œconomy.* That the mercury is partly thrown off by the skin, we have incontestible demonstration in the chemical changes on metals which it produces.

However, these latter considerations may be regarded perhaps more safely, at present, as matters in abeyance, and food for further reflection. It is certain they point to matters of the highest import; and it would only accord with the simplicity of Nature, if, through the contemplation of violent diseases, and violent or poisonous remedies, we arrived at nothing less than the perception, that all diseases and all successful remedies had but one, or at most two, modes of action,—viz. determination to the surface and equalization of the circulation; and unsuccessful actions or remedies destructively poisonous but the contrary of these conditions.

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great courage nor of resignation, but a peculiar indifference, such as we see in trifling maladies. Yet I have often removed the same disease where the whole nervous system has been as active in its suffering and its apprehensions as in any malady whatever.

Premising, then, that the tendency of mercury to equalize the circulation is so universally admitted, that we often employ it with no other view in cases where *no* inflammation exists, I shall, as regards its action in inflammation, subjoin the following propositions, not forgetting to add the mode of its administration. Hereafter I shall resume the consideration of mercury; in relation to which I have facts of great value, as throwing light on the use and abuse of this mineral, not only in inflammation, but in various other disorders. It appears then—

1. That mercury acts in inflammation by its power of equalizing the circulation, and this, by determining to the surface of the body, to which, if the equilibrium be still disturbed, the excess of action is transferred.

2. That the tendency of mercury to equalize the circulation in all cases where its equilibrium is disturbed, is universally acknowledged.

3. That equalization of the circulation is obviously destructive of that determination of blood which is a necessary element in all inflammations.

4. That restoration of equilibrium appears to be the essential remedy in inflammation, be the equilibrium restored by what measure it may.

5. That, therefore, this view of the *modus agendi* of mercury is remarkably in harmony with all the facts of the subject, and especially with that which it is the object of the preceding pages to establish.

6. Because, whilst there seem to be no facts impugning these views, the phenomena are reconcileable with no other.

As to the administration of this remedy in inflammation, I have already observed that calomel in combination with opium is the best form for its administration; and, generally, about two or three grains of calomel with half a grain of opium is the proportion: this being given every three or four hours until the system be affected, or until (which is the best proof of it) the inflammation begins to subside. We then lower the dose by giving it at longer intervals, by diminishing the quantity, or by both: and in some cases, where the ptyalism is severe, we relinquish the mercury altogether; experience shewing that the effect of the mineral is sustained, in many such cases, for a considerable time after we have ceased to administer it.

In cases where the opium appears to affect the head, or, at first,

and before the mercury produces its peculiar effect, it produces excitement, or diminution of secretion, we lessen its quantity. Where the calomel, on the contrary, affects the bowels, we increase the quantity of opium; but not by more than a quarter or half a grain, at the utmost, at a time: and in some constitutions, where there is evidence of deficient power, one grain of calomel and one-fourth or one-sixth of a grain of opium may be sufficient for a single dose. In other cases, on the contrary, where there is good power, and the inflammatory excitement is urgent, we give even larger doses than that first mentioned; but it is generally necessary, if we increase the calomel, to increase the opium also, and *vice versâ*. Children are not so readily affected by mercury, in proportion to their age, as adults; yet if they become suddenly or severely affected, the consequences are usually more serious.

I know of one case, where the child of a medical man becoming seriously influenced by mercury, extensive sloughing took place, and the child died. A very good mode of administering mercury in children, I mean where we wish to "affect the constitution," as it is termed, is by combining two or three grains of the hydr. c. creta with a grain or two of Dover's powder; and this given every four or six hours, according to circumstances.

I shall have a great deal to say on the subject of mercury in respect to the various intentions with which it is administered; but such observations as are of general application I should mention here.

Generally, the peculiar effect of mercury on the constitution is gradual; so that we are apprised of its action becoming general by certain signs which enable us to preserve and prevent unnecessarily violent or untoward consequences. Thus, we find the pulse becoming softer, perhaps accelerated; the skin exhibiting habitual, but perhaps gentle, moisture; perhaps some increase in the urinary secretion; the breath begins to exhale a peculiar odour, *seldom* perceived but as the effect of this mineral; the patient has a disagreeable, coppery, or otherwise metallic taste in the mouth; the gums appear more vascular and somewhat elevated. These signs, in various degrees, or in different combination, warn us that the mercury has affected the system, so that we begin to diminish the doses accordingly: but it must be remembered, that occasionally a very violent evidence of mercurial action occurs very suddenly: thus, in the evening the patient may exhibit little if any indications of the mineral, and yet, in a few hours, the characteristic evidences of it may occur with unusual violence, and far exceed-

ing our intentions or wishes. This is certainly not common when mercury is judiciously given; but still, as it does happen, we must be alive to its possibility; and, in cases where an increased dose becomes necessary, be satisfied with cautious and reasonable augmentations of it.

An example of this happened once in my own practice. The case was watched with the utmost vigilance; and, although the patient's system was somewhat tardy in its recognition of the mineral, yet the doses were only those usually given: nevertheless, in a single night, salivation came on in so severe a degree that I never saw an instance like it. The patient ultimately did well, both as to the mercury and the inflammation for which it was administered; but I was very anxious, fearing for many days that the tongue, which hung out of the mouth in the form of a swollen, yellow mass, would slough. At present, in *inflammation*, we make the digestive organs, as you perceive, the portals through which we convey mercury into the system. This method has some advantages and some objections, the adjustment of which requires a more refined analysis of the causes of deep-seated inflammations, as occurring in different individuals, than has been hitherto made. But if there be any truth in the principles I have unfolded in regard to inflammation, the path is now opened auspiciously for such an extension of our knowledge: wherefore, as the other modes of affecting the constitution by mercury do not, *at present*, apply to the treatment of inflammation, I shall here conclude my remarks on the use of mercury, so far as it belongs to the general treatment of inflammation.

I have thus endeavoured to place before you, in the plainest manner I can, the object to be kept in view in the general treatment of inflammation; and the best manner in which, according as your perception of its cause is clear, imperfect or unattainable, such objects are to be accomplished.

It follows, that the grand desideratum will be the equalization of the circulation; as this is not only opposed, but antithetical to, and inconsistent with, that determination to a part, without which inflammation appears impossible.

That the main point, paramount to all others, is the discovery of the particular organ in which the *cause* of the inflammation resides, which will very commonly be found *not* in the organ inflamed.

That this principle applies with equal force to inflammation generally, and those dangerous extensions or modifications of it which supervene on local injury.

That, generally, whilst all beneficial proceedings act by equal-

izing the circulation, *quoad* the inflamed part, so all attempts at this appear most auspicious, as they determine, in a *practical sense*, to the surface of the body.

That where, from the impossibility of perceiving the real cause, as distinguished from the exciting cause of the inflammation, we cannot direct our measures to a particular organ, but where we are obliged to endeavour to effect our objects by means of a general kind, a summary of the general treatment will be as follows:—

1. Rest of both mind and body generally, and of the part in particular.

2. Abstinence.

3. To empty the alimentary-canal*.

4. To promote its secretions in the manner and on the conditions spoken of under the article "Purgatives."

5. The use of tartrate of antimony, both in regard to its peculiar effects, and as furthering those sympathetically induced by the actions of the alimentary canal.

Bleeding in the various ways, in different cases; regarding this, *however, with the exceptions* referred to, as the remedy which it is desirable to avoid, as one which ministers more to the effects than the causes of inflammation, and one which, in a more enlarged state of our knowledge, will, the case of "absolute general plethora excepted," *at no distant period* cease to be necessary.

Determination to the surface by counter-irritation, &c., vapour baths, &c., the latter being probably of still greater importance than we commonly believe. And if the inflammation be severe, far advanced, or threatening, the prompt administration of calomel with opium, as the most potent of all remedies yet discovered, in equalizing the circulation, regarded in a general sense.

In general, the order in which these remedies should be employed will be that above stated; but this will necessarily be modified by the description of the case, and the period at which we are called on to treat it: but, in all cases, *intervals of longer or shorter duration* are to be allowed between the various measures, according to the severity of the case, in order that as great an approximation to inductive reasoning may be kept in view as is safe and practicable; and that cases which require the absolute, simultaneous employment of so many measures as are generally adopted, are *exceedingly rare*.

* I do not here mention emetics; the use of these has been referred to in treating inflammation, by ministering to its real causes, and the more modified effect of this class of remedies in the remarks on tartrate of antimony.

DISCOURSE XI.

ON ERYSIPELAS.

In conducting the argument on inflammation, I have been obliged more than once to speak of erysipelas, and to mention those circumstances by which it is characterized, both locally and constitutionally. In erysipelas, we observed that the redness and swelling are always more or less diffused: we cannot perceive any well-defined line separating the affected parts from those which yet remain sound; but the redness and swelling become insensibly shaded off, as it were, until we arrive at the sound parts. Usually, the swelling extends beyond the redness; and, whilst the red parts are elastic, those swollen without being red will not unfrequently pit a little on pressure. If we make a little pressure on the red parts, the redness disappears for a moment, but speedily returns when the pressure is withdrawn. These appearances usually present themselves at first in a small district, whence they extend with greater or less rapidity in different cases. In some, they reach in a few hours the extent which they are to occupy. In other cases, two or three days may intervene,—the erysipelas being at times stationary, or slowly extending during this period, and ultimately occupying the whole limb. Generally, we observe that the degree of swelling bears some proportion to the extension of the erysipelas; but occasionally we observe the swelling occupying a large district, whilst the redness may be confined to one *comparatively* small. The seat and progress of erysipelas are different in different cases: sometimes the skin only is affected, and this very superficially; at others, the cellular tissue beneath it, or even the fascia beneath that again. In the *severer* forms, the inflammation generally *commences* in the cellular tissue beneath the skin; the fascia beneath it and the skin above participating more or less, according to the vehemence of the inflammation. When erysipelas thus commences in the cellular tissue, the fascia is sometimes little affected, whilst the skin is always, in a greater or less extent; that extent seldom, how-

ever, being commensurate with the inflammation of the cellular tissue beneath. The progress of erysipelas also varies; sometimes it creeps from one part of the skin to another, retiring from those parts first occupied by it (erysipelas erraticum); sometimes it extends from the original site in a continued form, still affecting only the skin, and that superficially (erythema); and it either retires, simply producing a desquamation of the cuticle or scarf skin, or leaving, in some cases, a kind of ulcerated, in others scarcely more than a raw, surface, which quickly heals.

These, however, are in general light cases: the erysipelas which surgeons are called on to treat, and which they generally intend by the term, is a more serious affection, and presents, both in its characters and progress, the features of severe inflammation. The inflammation extends more or less rapidly from the site it first occupied, often involving the whole limb. There is extensive redness; sometimes a tint of yellow; great swelling; and, this continuing, the skin may either slough or ulcerate, discharging the products of an imperfectly developed suppuration; that is, matter, some of which may be well formed or healthy-looking, with other portions of an unhealthy character, or mixed with blood and sloughy cellular tissue; or the whole process may be, in its leading features, of a sloughy character, large portions of skin or cellular tissue, or even fascia, being thrown off in a shreddy or otherwise decomposed or altered condition. When sloughing, either in a great or a more measured extent, is to take place, vesications frequently arise on the surface, the skin beneath them exhibiting a dark fiery-red, a yellowish, or even a blackish, colour; and, if all this is to happen, the general colour of the inflammation is found to be of a darkish-red, *approximating* to the colour of the venous, rather than arterial, blood. In all cases of this form of erysipelas, we observe a strong tendency to mortification; so that we can hardly say that this kind of erysipelas ever terminates, properly speaking, in suppuration. For, although there be frequently enough, perhaps generally, *some pus* formed, yet it is often unhealthy in character. We find it mixed with fragments of sloughy cellular tissue, blood, and more or less sloughing of the skin. Instead of proceeding from a circumscribed cavity, the pus comes obscured by a variety of different appearances, the result of inflammatory action or effusion, from an irregular district of boggy cellular tissue. This is the case we call *phlegmonoid* erysipelas. The constitutional disturbance varies in different cases; but it is generally

severe. The complaint is preceded or accompanied by sensations of cold or shivering; an inflammatory excitement supervenes; the pulse becomes frequent, sharp, and bounding (not often hard, I think); there are thirst, dry or foul tongue, want of sleep, often pain in the back or head, or both, and all the symptoms of fever; loss of appetite, and almost always a vitiated state of the secretions; the bowels are *generally* costive; but to this there are exceptions. If the erysipelas is to proceed, this state of disturbance soon becomes still more alarming: the brain becomes disturbed; the pulse falters in its power, whilst its frequency is continued, or even increased; the patient becomes delirious; there is a dark state of tongue, sometimes red and dry, but soon becoming black; often involuntary twitching of the muscles; and death closes the scene. In other cases, the fever, having reached almost any height, is found gradually to subside; the tongue becomes moist and clear; the secretions natural; and the patient recovers; regaining his strength more or less rapidly according to the natural powers of his constitution, the severity of the attacks, the treatment employed, and the extent of parts requiring repair.

There is a considerable variety observable in the severity of *febrile* disturbance in erysipelas; nor is this always commensurate with the degree of local mischief. Examination of the abdomen will sometimes detect tenderness in some part of this cavity, and not unfrequently in the region of the liver. There is also great difference observable in the pain experienced by the patient. In some cases, it is very trivial, or rather a sense of heat or itching, or both; in others, the pain is very acute, and, occasionally, extremely severe. Nor are these varieties always proportionate to the degree of inflammation.

NATURE OF ERYSIPELAS.

Could we understand all Nature's processes alike, it is probable that they would all be equally interesting; but, as our capacities on the one hand, and our misdirection of them on the other, are found practically to limit our perceptions comparatively to a few of such processes, it appears to me, that, of all inflammations, no one, singly considered, is so instructive as erysipelas; for that it is an inflammatory disease, is so generally admitted, and, what is still more to the purpose, so demonstrable, that I need not at this day moot that question.

Occupying a position, as it were, between more healthy inflammation, and those which are either still further removed from it, or attended, as in the case of gout, with a sort of mysterious peculiarity, erysipelas enables us to connect, in a continuous chain, inflammatory actions *apparently* so different from each other, that, were the link it affords absent, this connection would present difficulties which might reasonably be expected to prove insuperable. I have already availed myself of this connection. If you will only contrast gout, for example, either in its local or constitutional features, with common or healthy inflammation, you will perceive what an apparent gulph there is betwixt them; they, in fact, *appear* to have but few things in common: but, if you now place between them the various examples of erysipelas, and those inflammations allied to it in character, you are not only enabled to trace the chain very easily, but you find that the various links are so interwoven with each other, as it were, that you ultimately discover those distinctions which your nomenclature implies, to be essentially artificial, and that they really apply only to the more marked examples of the varieties to which they refer. As I am desirous of inculcating enlarged views, I would observe that these connections between different diseases are by no means restricted to those we call inflammatory; and, so far from being sources of difficulty, become, when properly considered, not only highly useful, but an essential element in all investigations by which we can hope to arrive at a real knowledge of disease. To those who attach such value to nomenclature as to consider that medical science can be advanced by an attempt to give every disease a name, such gradual shadings off in diseased actions will, of course, always prove sources of insuperable difficulty; but, without meaning to argue that a well-adjusted nomenclature is of no use, it is perfectly certain that a knowledge of disease is an indispensable preliminary, in any endeavour at a nomenclature which can be rendered available for scientific purposes. A very mischievous error, in the present state of medical science, is, that so much of the nomenclature is founded on circumstances not essential to the disease; so that diseases, essentially the same, have different names applied to them; whilst diseases, often depending on very different causes, have the same name. Cardialgia, gastrodynia, pyrosis, are names drawn from symptoms which are common to many disorders; whilst the whole nomenclature of diseases of the skin abounds

with the contrary; that is, different names applied to diseases essentially the same.

But the importance of those gradations, in leading us to the interpretation of Nature, is not seen even when extended to diseases generally. We find that in all the kingdoms of Nature, whether regarded as matters of mere scientific research, or as a step to the sublime truths of natural theology, it is through the relations thus established that we are enabled to understand anything. It is, in fact, by such means that we perceive those connections unfolded in comparative anatomy; that we discover the "connection of the sciences;" and, ultimately, that of the whole creation with all parts of it.

Before proceeding with erysipelas, I should mention one or two points in its nomenclature. Erysipelas following a wound is sometimes called *traumatic* erysipelas; when occurring without a wound, it is sometimes termed *idiopathic;* when the previous disturbance is well marked, it is sometimes called *symptomatic;* sometimes the inflammation is accompanied by unusual extent of swelling, indicating extensive effusion in the cellular tissue, far beyond the inflamed part, with pitting on pressure, sometimes called œdematous erysipelas; then there is the phlegmonoid erysipelas, already spoken of (erysipelas phlegmonoides). There is no essential difference in these cases; the general *nature* of the disease is emphatically the same.

I must now observe to you, that two things in regard to erysipelas are admitted on all hands; first, its inflammatory nature; and, secondly, its invariable connection with a previously disturbed state of the animal œconomy. I may add that it may occur as a sequence on local injury, or without any perceptible injury of this kind whatever. The admission of the inflammatory nature of erysipelas does not, however, always lead an author to recommend the treatment usually addressed to inflammation. The admission itself is sometimes rather implied than acknowledged: thus Mr. Pearson (Principles of Surgery, p. 187) says, that he regards the relation of erysipelas to inflammation "as very remote." He also (on Treatment) says, that gentle aperients, the determination of an equable circulation to the surface of the body, &c. are the principal measures; that powerful evacuants are often mischievous; and, of bleeding, that, "in large towns, cases seldom occur in which it is necessary or even admissible." He also recommends the free divi-

sion of parts where erysipelas follows on wounds, &c. After stating what he conceives to be the more common causes, he says that they will be influenced "by the state of the system." You have already seen that the older surgeons, as Wiseman and Heister, recognized the connection of erysipelas with a disordered condition of the system; and that Cullen does also.

Dessault, one of the best practical surgeons France ever produced, recognizes the connection of erysipelas with disordered function, and speaks particularly of a "bilious erysipelas;" and he says, in another place (see Œuvres Chirurgicales, par Bichât, t. ii, p. 583), generally, "c'est surtout à l'état primitif *des premières voies* qu'il faut faire attention pour les placer dans celle qui leur convient."

Lassus, in his Pathologie Chirurgicale, tome i, p. 8, speaks of "plethora, suppression of habitual discharges, disorders of the biliary secretions, undigested aliment generally, and particular substances taken into the stomach, as causes of erysipelas." He recommends emetics, purges, and blisters.

Baron Boyer, after saying, of erysipelas, that it generally occurs from internal causes, says that, although these are often unknown, yet, from the good effects of emetics and light aperients, "on sera tenté de croire que cette cause a ordinairement son siège dans les premières voies," &c.; besides which general recognition, he states, as causes of erysipelas, obesity, bad habit of body, gross food, high meat, excess at table generally, the abuse of spirituous or fermented liquors, and many others, implying a disordered condition of the body. Bleeding, he says, is not often necessary, and should be regulated by the powers of the patient previous to the attack: he appears, however, partial to bleeding in phlegmonoid erysipelas.

Mr. Copeland Hutchinson, in the fifth volume of the Transactions of the Medico-Chirurgical Society, in recommending incisions in erysipelas, attributes the alarming nature of the cases which had come under his care to "the intemperance and exposure to frequent and sudden changes of climate" to which the patients (seamen) are exposed. He seems to have adopted local bleeding only, except that consequent on the incisions, which "yielded," in general, from fifteen to twenty ounces. His other treatment consisted of aperients and sudorifics, and bark, as recommended by Dr. Wells and Dr. Fordyce, after the reduction of the inflammation. He says also, that, "for the last five years, by the treatment" ("incisions"), "he had not lost a case," &c.

Mr. Lawrence, in a practical Essay on Phlegmonous Erysipelas, in the fourteenth volume of the Transactions of the Medico-chirurgical Society, and of which I shall speak more presently, very plainly describes the connection of this disease with constitutional causes. He says, speaking of the causes of the disease, that "the habitual excitement of the vascular system, or the long-continued disturbance of the stomach, alimentary canal, and liver, consequent on intemperance or excess, *lay the foundation of inflammation generally;* and it depends on individual peculiarity, or on local causes, whether the skin or other parts shall be the seat of disease. In most cases of erysipelas, the biliary and digestive systems are more or less actively disordered; such disorder appearing sometimes to produce the cutaneous affection, sometimes to be excited sympathetically by it." And, in commenting on the division of Dessault, of bilious, as contradistinguished from phlegmonous, erysipelas, Mr. Lawrence remarks—"on which division it may be observed, that the symptoms called bilious are commonly found also in the *phlegmonous* cases."—Op. cit. p. 37.

I have given you a few quotations from different authors, to shew that, notwithstanding the differences of opinion on points more or less important, as the case may be, evinced by different writers, yet that they all agree in the recognition of the connection of this complaint with previous constitutional disorder; and, whilst on many points they differ so much, that a statement of the several opinions would occupy far more space than that necessarily allowed for the whole of this discourse, and be, as I believe, very unprofitable, it will be of more use briefly to state the points on which they agree. Thus, whatever they may think as to the closer or more distant alliance of erysipelas with common inflammation, they all agree in the local appearances presenting heat, redness, pain, or itching, and that the results are, in different cases, suppuration, more or less unhealthy, mortification, and so on. We also find that (whatever the opinion of one or other writer may be as to the seat of the disease) we have plenty of evidence shewing that it occurs, in different cases, in one or in all the structures said by one or the other to be more *particularly* involved in it. These are the skin, the cellular tissue, and the fascia beneath it. Again: whatever difference of opinion we find in individual writers on the treatment particularly thought the best, we discover plenty of evidence shewing that the only point on which they universally agree is the existence of general disorder of the body, and attention to

the chylopoietic viscera, in aid of the correction of this disorder, with the employment of measures well known to determine to the surface of the body. We therefore, so far as the conflicting evidence of all writers is concerned, will proceed in the same manner as we should do in regard to conflicting evidence on any other subject; that is, set down as philosophically true that only in which they all agree. This, then, will involve the following points:

That the local characters of erysipelas are those by which we ordinarily define inflammation—heat, redness, swelling, &c.

That it is connected with some disorder of the general system.

That the treatment always includes endeavours which have a tendency to correct such disorder, and also measures which have a direct tendency to determine to the surface.

If to this we can add what appears to us the testimony of Nature, or if we can find even that she does nothing to contradict such testimony, why then we can reason on such facts in strict conformity with the principles of induction.

With regard to the dependence of erysipelas on general disturbance of the constitution, I can only say, that I have examined the subject with all the care of which I am capable, and with no lack of opportunity for at least the last sixteen or seventeen years; and that I consider the dependence of erysipelas on such disturbance, whether occurring after local injury, commonly so termed, or after some injurious influence of another kind, acting on the body, as demonstrable, in strict conformity with the rules of induction, as any truth in the whole range of natural philosophy.

The causes of erysipelas, however, will be different in different cases; but they involve general disturbance of the œconomy in all. In one, impressions on the nervous system seem to be the primary causes of the disturbance; in another, disorders of the stomach, bowels, liver, &c. In other cases, although the impression acts ultimately on the nervous system, we cannot trace it to causes acting directly thereon, but recognize it as a gradual effect, wrought up by continued disturbance of particular organs, the chylopoietic viscera more especially. Thus, persons who live irregularly or luxuriously, or who maintain a constant undue excitement in these organs, are especially liable to erysipelas. We cannot, in fact, always connect erysipelas with disorder of one particular organ; but, in cases in which the cause is most latent, I have been led, by experience, to look with especial suspicion to the liver. I just mention this, at present, as a practical fact, without meaning to in-

sinuate more than I say in regard to the general nature of the causes of erysipelas.

In a vast number of examples, an accident, and frequently one of a very trivial nature, is the first occasion on which disordered conditions of the system are manifested. So long as Nature has only to support life, the system hobbles on, as it were, under the influence of factitious excitement, without the occurrence of any manifestations which we regard as disease; but the moment she receives any little shock, or especially if she be called on for any of that increase of exertion which is implied in repair of injury, the real state of the system is made manifest; and there is a fearful exhibition of the want of power in the animal œconomy.

The pervading susceptibility of the nervous system, in patients disposed to be affected by erysipelas, since it affects the whole system, affects, of course, the nerves of every part, and thus renders many causes, ordinarily of a very trivial nature, sources of undue excitement.

Now, as to the want of power above mentioned, erysipelas is frequently the mode in which this is exhibited; and it is to this character that I wish especially to direct your attention, because it not only, in a great degree, explains the nature and local symptoms of the disease, but it is, of all others, the most useful impression to retain in the conduct of your treatment, be that treatment one or other of the various kinds which have been instituted for this complaint. It is through a careful adjustment of the question of power that the discrepancies in the treatment of this disease, which, *primâ facie*, are so discreditable to the study of medical science, are to be reconciled.

This leads us, then, to consider erysipelas as occurring after a wound, which is commonly spoken of as a case of traumatic or surgical erysipelas. For this purpose, I shall suppose the most instructive case, which every surgeon knows to be of frequent occurrence; namely, one in which the wound has been very trivial. A man, free from any visible marks or even feelings of disease, receives a slight scratch on his finger or his skin. He takes little notice of it, but follows his usual avocations. The following day, however, he finds the wound become painful, and surrounded with redness and swelling. The redness and swelling extend to a greater district; then up the whole limb. He is, perhaps, shivering and cold; he then becomes feverish, and feels great prostration of strength. The wound exhibits no attempt at repair; the swelling,

continuing, becomes darker in colour; spots of vesication form in different places; and the skin rapidly sloughs: these sloughs extend; the whole limb presents various patches of mortification; and the patient becomes wandering, the pulse rapid and feeble, the tongue dark and dry, and he sinks; dying, in fact, in a state exactly resembling typhus fever.

I have chosen this sort of case, because I would at once avoid the long and unnecessary discussion, which a more severe injury might render necessary to those who consider the subject for the first time, to shew that the wound, in the abstract, beyond being the exciting cause, had nothing to do in the real causation of these terrific phenomena. What, then, do these phenomena shew? First, they evince great excitement; next, great absence of power, and, by consequence, the important distinction which exists between them—a distinction of universal importance in all diseases, of whatever aspect or kind, as you will hereafter more clearly perceive. As regards power, the mere scratch is not healed; large districts of the skin die; and ultimately, in many cases, the patient sinks. There is no approximation to evidence of the healthy resources of the animal œconomy; but of excitement we have plenty. The functions of the arteries, which should have quickly repaired the injury, become preternaturally active; but, instead of repairing, they quickly exhaust, the powers of the part; and mortification ensues, instead of repair.

Of the causes which disturb the system I have already spoken; but, to shew how real they are, and how insidious, and how marked in parts in regard to which the ordinary indications were absent, I will cite a case or two. I do not here repeat what has been said as to the influence of the wound; such as wounds occurring without erysipelas, and erysipelas without wounds. (See Inflammation.)

A gentleman, about fifty-six years of age, had a large tumour on the neck; it occupied a district extending from beneath the ear, which it had thrust upwards, to a considerable way down the neck; in size, it was about as big as a large orange. On examination, it appeared not very tightly connected to the subjacent parts; but still it had not that freedom of motion which was desirable. He had consulted Mr. Cline, Sir A. Cooper, and Mr. Abernethy, some years before I saw him: the opinions not being very decided in either case, nor exactly agreeing; some inclining to its removal, some disposed to temporize. When I saw him, the tumour was represented to have increased. My opinion was, that its removal

might be safely attempted; but that it did not appear to me to be necessary, since he was in good health, and the tumour gave him no pain, nor any other annoyance excepting the deformity it occasioned. I, however, impressed on him the necessity of watching the progress of the tumour; and, with this view, to take accurate measurement of it, which he allowed me to do; and to attend to his general health; "for," said I, "if the tumour were to increase much, and its character remain unaltered, I should alter my opinion, and recommend its removal, lest it should acquire a depth and extent of connection which might render its removal alike imperative and dangerous;" but I added, that, as the tumour had increased, as he said, it would be satisfactory to me to test the propriety of my views by a consultation. He accordingly consulted Mr. Abernethy, who examined the tumour very accurately, and seemed inclined to think that it was the parotid gland; but I respectfully objected that it appeared to me to be too moveable, and that, therefore, it was probably only connected with that gland. On feeling it again, Mr. Abernethy assented to this view, and very fully agreed in the opinion I had given of the case. I was requested by the patient to call occasionally, and watch the tumour. At first, it did not increase; on the contrary, we thought that, if any difference, there was a slight diminution. At length, its increase became very unequivocal, and its adhesion to the subjacent parts more close. I now laid before him, as nearly as I could, all the circumstances appertaining to the case; concluding by saying I would not press the removal of the tumour; but, if ever he intended to have it removed, that I should advise him not to delay it. Another consultation was held; and this opinion being confirmed, he decided that he would have it removed.

I should mention that this gentleman stated that, until thirty, his habits had been rather free as to eating and drinking, but still not intemperate, in the ordinary sense of that term; whilst, for the last twenty years, they had been remarkably regular; his diet was plain; and his drinking very moderate—chiefly a glass or two of ale after dinner, seldom taking wine, and then only in moderate quantity. I should mention that he was stout and somewhat corpulent; and indeed the only thing wrong in his habits appeared to be a deficiency of exercise: but all his secretions appeared healthy; his pulse was regular; his tongue perfectly clean; and his appetite natural. A most accurate examination of his abdomen—a measure, in my opinion, which should never be forgotten,

as preliminary to all severe operations which are not absolutely unavoidable—detected not the slightest evidence of disease, the corpulency excepted. There was no pain, tenderness, nor fulness, nor any other evidence of visceral disease: and it is interesting to remark that the region of his liver was most scrupulously examined. His mind, too, was very remarkably tranquil, and even cheerful.

I removed the tumour in the presence and with the assistance of Mr. Lawrence and Mr. Stanley. Nothing could proceed more favourably than did this case, until the only remains of a very large wound made in the operation were a spot about as big as a sixpence. His friends had called on him, to congratulate him on his recovery; and no one had any idea but that all danger was over. On calling on him, however, one morning, I found him unwell. He told me of a circumstance which had occurred the evening before, and which had annoyed him considerably—that he had had a bad night, and felt cold: his bowels, which had been perfectly regular, had not acted as usual. On looking at the wound, I observed nothing but a small halo of redness around it; and, although I said to a friend who joined me on leaving the house, "I hope he is not going to have erysipelas," still I had no real apprehension of it. However, the next day there was a small district of erysipelatous inflammation. Notwithstanding that everything which was thought right was done for him, he became delirious, and died typhoid about a week from the appearance of the inflammation.

I could by no means understand this, unless there was some visceral disease; and I was therefore particularly anxious to examine his body. This I was allowed to do; and I must confess that, although I felt convinced that I should discover something which we had not suspected, yet I was surprised when I found his liver to be in such a condition, that I could not assert any part of it to be healthy. The whole viscus was of a nutmeg colour; and, both in this respect, and in a peculiar brittleness of structure, was exactly that which is frequently observed in those who have been addicted to ardent spirits. In short, apart from tubercles, abscess, or other depositions, I had seldom seen a liver more markedly or more universally unhealthy.

The following case is also worth notice:

A man, fifty or sixty years of age, was visited as a patient of the Finsbury Dispensary, with an erysipelatous inflammation of the knee-joint, attended with œdema of the neighbouring parts; for

which he had been previously treated by aperients and bleeding, to the amount of *three pints*. His habits were rather intemperate; his employment sedentary; and he drank about four pints of small ale daily: moreover, he was subject to gout, and had had a similar attack some time before, from the prick of a nail. As the foregoing treatment appeared to have produced no benefit, and as he evinced disorder of his liver, with imperfect function of his kidney, attention was first directed to the liver, and subsequently to the urinary organ. At first, this plan was followed by marked improvement, but with occasional relapses of his former condition; which, however, again improved under a renewed activity of this plan, combined with measures directed to his skin. Notwithstanding, he did not get well; on the contrary, the local inflammation at length increased, and was treated by copious leeching, poultices, and by incisions, which discharged a large quantity of matter. He, however, continued weak; his debility increased; and, as this progressed, nourishing diet, cordials, and stimulants, as wine and ammonia, were employed. His biliary secretion *retained its improved condition;* and the bowels, though sometimes costive, at others acting somewhat too freely, were, nevertheless, in the main, kept regular. He sank, however; and, on examination, was found to have a thoroughly diseased, nutmeg liver, the spleen being paler than natural.

Here again there was indication of biliary disturbance, indication of its yielding readily to measures prescribed for its relief; and yet the liver was thoroughly diseased. I did not see the case; I was in the country at the time; but we need look no further than the liver and the man's habits for an explanation; although it may be questioned whether the loss of three pints of blood had not really as much to do with his death as the erysipelas.

Mr. Leigh's impression, during life, was, that the man fell a sacrifice to the bleeding; and so convinced was he of this, from his almost daily observation of the case, that he still thinks that the state of the liver acquired its fatal influence from the further debility of natural power, induced by so large a loss of blood in a subject so ill adapted to afford it.

When I came to town, Mr. Leigh told me that he was going to examine this man's body; but I said that, notwithstanding what had happened, he would very likely find a diseased liver, as proved to be the case.

These cases have some points of interest. The one to which I

would chiefly direct your attention is the total absence of any symptom of biliary disorder in the first case, and the flattering correction of such symptoms in the second. The first patient was not bled for the erysipelas; but he lost a good deal of blood in the operation, which, owing to the depth and close connections of the tumour, was tedious. The second lost, before his admission into the Dispensary, three pints of blood.

To pursue the subject of the circumstances on which erysipelas essentially depends, I confess that to me it appears that the true way of looking at the subject is to regard erysipelas itself as the most unequivocal, whilst it is the most obvious, symptom of disorder of the system; but, as this presumes the question as settled, it may be well to consider a little further the facts on which we conclude that erysipelas is to be thus regarded. These facts are, first, those which have fallen under my own observation; and, secondly, those which have fallen under that of others, whether of a trite or familiar kind, or such as are supposed to have occurred more exclusively to professional writers or practitioners.

Now, although not unwilling to test my own experience by that of others, still everything that I have written or shall write in this work is to be regarded as deduced, and I trust not incautiously, from my own observation. So I speak of the facts which have occurred to myself; not all the facts in detail, because no man forms an opinion as to the nature of a disease on facts so few as to be admissible in a work which is not solely devoted to the subject to which they relate; but in a general manner they may be stated.

I never saw erysipelas in which I could not connect it with some disordered condition of the general system, or some part of the system, or with some chain of circumstances which were obviously, and indeed notoriously, of a disordering tendency; and the latter is very important to be remembered. Because, if I knew a man's habits to be indolent, intemperate, those of a full feeder, without what is usually called intemperance,—or if I knew him to have been, in the absence of either or all of these, subjected to depressing influences on the nervous system, whether these had operated as direct sedatives, as a serious calamity, or the more slow, but not less sure, depression consequent on anxiety and excitement,—I should not think that the erysipelas depended less on the peculiar state of his constitution, merely because I could find no particular disorder, much less disease, of any particular viscus;

nor should I think the nature of the case less certain, though he might have a clean tongue and a good appetite (which by the way I never saw). For, although nothing is more true, nor anything of more practical importance, than the fact that erysipelas is generally more immediately connected with disorder of some one or more of the functions of the body,—yet the material element in its causation is excitability, with deficient power, be these occasioned how they may; and although visceral disorder, and still more visceral disease, are the most certain and the most constant agents in the production of this condition, yet they are not to be regarded as essential to it. In other words, we know that excitement may be occasioned without visceral disorder; and we know that debility may also be produced without any discoverable disorder of that kind; and we know, again, that excitement, if continued, does in all cases produce debility; and we know, also, that the occurrence of debility by no means necessarily implies the discontinuation of excitement; on the contrary, we frequently see the excitement increased by it.

Many causes of a moral nature often demonstrate the foregoing propositions; as grief, fear, anxiety, and the like. But physical causes are not less perceptibly influential in the production of the phenomena referred to;—thus, bad air, unwholesome food, vicissitudes of temperature, are equally potent in the production of debility; and generally, perhaps, intermediately through the excitement they occasion. But, notwithstanding these facts, as bearing on cases which, superficially regarded, appear sometimes as exceptions to a general rule; still, it is very seldom that we have to seek the explanation of erysipelas in any such precursory occurrences alone.

For the most part, erysipelas is connected with a very tangible *condition* of visceral disorder, and in all cases is accompanied by unequivocal proofs of its existence. The fever, the furred tongue, the loss of appetite, disordered states of the bowels, though different in different cases, are always present in a greater or less degree in erysipelas: and that the cases in which the more prominent marks of the disorder of these parts are either simultaneous with the occurrence of erysipelas, or perhaps even secondary to its early development, are not to be explained otherwise than on the supposition of a previously disordered condition of various functions, or of some one function, as the case may be, seems clear; because, whilst various circumstances will produce inflammation on the surface, and, as in blistering, somewhat too of an

erysipelatous character, we cannot *certainly* produce either erysipelas or the constitutional disturbance by which it is characterized, by any accident or artifice whatever. A man may have the severest form of erysipelas from the slightest scratch, or he may have the most severe and complicated injury without any erysipelas whatever. So that we can in no way connect either the general or local character of the disease with the local or general circumstances in the relation of direct cause and effect, in the practical or philosophical sense of the word; but when we look to erysipelas more carefully, we find it connected in many cases with more particular or more permanent disorder of particular organs; and of these I know no *one* by which this is more frequently exemplified than the liver.

The frequent coexistence of disorder of the liver, including congestion of that organ, is an important point in the consideration of erysipelas. I have mentioned Dessault's record of the circumstance. We often see the disorder very prominent during life; secondly, after death, in changes of structure, of which the symptoms during life afforded little or no indication; and again, we infer it, though with less certainty, of course, from the fact that some of our most potent remedies in erysipelas, though not administered with that intention, have, amongst other properties, these two,—viz. a power of producing very marked effects on the liver, and also considerable influence in equalizing the circulation. This applies to other remedies; but the one to which I now refer is mercury, and especially calomel.

We must not, however, infer that there is any *peculiar* connection between disorder of the liver and erysipelas; for even if erysipelas be more constantly connected with disordered liver than any other organ, yet this may merely be explicable on the ground that the liver is more exposed to, or more affected by, those habits of living which produce other derangements favorable to erysipelatous inflammation. A gorged liver is constantly pouring a very large column of blood almost directly into the heart; this is certain; and it it is equally so that this may produce excitement of the organ, or add to that which it may derive from other sources; and which excitement is an ever-failing concomitant of erysipelas. These circumstances may indeed render the liver a frequent seat of disturbance: but we must not infer that this is invariable; for nothing, I think, is more clear, than that the disordered condition in other instances depends on other organs; and, in some instances, on influences of

a moral kind, which appear to have acted primarily on the nervous system as a whole.

A question has been mooted, how far erysipelas occurs in other parts than those mentioned at or near the surface of the body; whether, in fact, it occurs in parts situated in the interior of the body. If by this is meant an inflammation, presenting exactly the same appearances and exactly the same results as we observe when it takes place on the skin, or the structures immediately beneath it, I do not see that we have any facts by which we can demonstrate such similarity; but if we regard the question as referring to the presence of the same general characters, and especially to that departure, which erysipelas on the surface and certain inflammations in the interior of the body alike present, from what we have reason to regard as healthy inflammation,—why then, indeed, I think the similarity very striking.

The rapid diffusion of inflammation in erysipelas is exactly what happens in inflammation of the peritonæum, the pleura, or the membranes of the brain. In both, in many cases, we see the same failure of that adhesion which circumscribes healthy inflammation; and in both we see abortive attempts at it. In erysipelas, in the thickening and consolidation of many parts of the cellular tissue, and in membranous inflammations, in that irregular intermixture of the adhesive process with the other products of inflammatory action, which it is found practically not to have circumscribed. Mr. Lawrence seems, I think, to doubt this analogy in page 19 of the very excellent paper already quoted. In speaking of erysipelas occurring in internal membranes, &c., Mr. Lawrence observes, "The proof of such an opinion would consist in shewing that the same peculiarities which distinguish erysipelas from other inflammations of the skin, are found in certain inflammations of the parts just enumerated*, and that such affections may hence be distinguished from ordinary inflammation of the same organs. No attempt of this kind has been made; on the contrary, nothing can be more vague or unsatisfactory than the arguments by which Frank attempts to support his opinion. Since the distinguishing characters of erysipelas are clearly referrible to the peculiarities of the cutaneous and cellular structures in which it occurs, we could

* "Conjunctiva, mouth, fauces, of the respiratory and alimentary mucous surfaces, of the serous membranes, in the head, chest, and abdomen, and of the brain, abdominal and thoracic viscera."

not expect to meet with the same affection in parts so differently organized as serous membranes and the viscera." In the first place, the existence of erysipelatous inflammation in internal organs is one thing; the power of distinguishing it from other inflammations is another. With regard to the observation of Frank, I cannot altogether agree with Mr. Lawrence; but, that the reader may judge of this, I have copied the quotation*.

I have already observed, of the local characters in many cases of membranous inflammation, that whether we compare those commonly observed with those of more healthy character, or with erysipelas, they are at least allied to erysipelas quite as much as they are to common phlegmonous inflammation. Again, the *distinguishing* characters of what we may agree to *call* erysipelas, may be well enough referrible to the cutaneous and subcutaneous tissues; but it does not *follow*, that though the physical characters of the inflammation be different, its nature must necessarily be so. Inflammation of the cornea and iris present very different characters, and very possibly resulting from the difference of structure; but they are in many, and indeed most cases, as to their essential nature, the same. In fact, as has been already observed when treating of

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* "Internum quoque et ad viscerum superficiem residens haberi erysipelas, a veteribus creditum, a recentioribus vero in dubium vocatum est. Novimus tamen, non modo in viventibus encephalitidem, otitidem, peripneumoniam, enteritidem, singulasque inflammationum species, comparente ad externam corporis superficiem erysipelate protinus disparisse; hoc ipsum vero ab externis genitalibus, sine interruptione phlogosis, per vaginam ad uterum; a facie ad fauces, asperam arteriam, pulmones, cæterasque ad partes internas manifeste penetrasse; sed etiam in cadaveribus ad urethram, vesicam, vaginam, uterum, ovaria, intestina, ventriculum, hepar; in pectore ad pleuram, bronchia, pericardium, cor ipsum ac vasa majora; in calvaria ad meninges, ad cerebrum ipsum, frequentius certe erysipelatosa, quam phlegmonosa occurrit inflammatio. Ex mammarum schirro, dexterrima licet manu, per cultrum ablato, erysipelas in singulis fere corporis externi partibus, ac tandem lethalis peripneumonia successit: post quam pulmones undique correptos erysipelate, ex flammeo rubentes, nec duros, sed copioso sero innatantes conspeximus; ac pars plurima certe peripneumoniarum malignarum cum erysipelate pulmonum incedit; nec durus, nec cocto similis hepati ac ponderosus in cadaveribus pulmo in illis detegitur. Nullum ergo de *interni erysipelatis* frequentia dubium superesse potest, licet signa charcteristica, quæ hanc potius, quam phlegmonosam affectionem ad viscera indicent: nisi ab externo et retropresso erysipelate, aut a manifestâ interni hujus mali ad externam partem non interrupta continuatione, ex epidemica per sectiones pathologicas confirmata morbi ndole, ex cachectica subjecti constitutione ac prona in erysipelas natura, ac demum ex causis inflammationi veræ parum faventibus, desumatur; adduci non queant."—*J. P. Frank, De Curand. Homin. Morbis*, lib. iii, p. 28.

inflammation, the process is modified very much, *cæteris paribus*, by the structure in which it occurs, as regards its appearances and its results; but we do not think it necessary to suppose it different in its nature on account of such circumstances. However, after all, I would rather be understood as contending, that many cases of inflammation of the membranes of the chest and abdomen are not demonstrably different in their nature from erysipelas, than that they are necessarily the same. What is more material, is, that they are both alike aberrations from what we have every reason to regard as the healthy manifestation of inflammation in the parts respectively; and that the point in which they constantly resemble each other, is that rapid diffusion of inflammatory action which is so characteristic of erysipelas.

Another question which has given rise to much discussion at different periods, is the contagious nature of erysipelas; but, narrow as this question may at first sight appear, you would very soon find that a proper consideration of it would immediately involve us in the question of the laws of contagion generally—a question which I have no present opportunity of considering, but which requires the aid of inductive philosophy as much as any with which I am acquainted. I can here only offer a few brief remarks. The facts in regard to erysipelas, and to all diseases whatever which appear to be communicable from one person to another, whether by contagion (in the sense of contact or contiguity) or by infection, shew this in common,—that neither contact, contiguity, nor breathing the atmosphere of the same apartment, nor even inoculation, will *invariably* produce the disease in another person. That also all the diseases will occur, in certain cases, without any of these circumstances, so far as it is possible to perceive; and that the first case must have so occurred, is evident, as regards any communication from the human subject. That, therefore, some other link must connect the chain of phenomena,—in other words, that there is some condition or other, be this what it may, which is necessary in order that exposure to contagion may produce disease in the person so exposed; and we know that many states of the system point very decidedly to the probable nature of this condition.

All the facts which I have adverted to, are true in regard to all diseases which have been regarded as contagious, although they apply with very different force to different varieties. The necessity of some condition of the body being an essential link in the chain

of communication is especially striking in diseases which, if they have once occurred, can hardly be produced a second time, such as small-pox; but even this is not without exception. In some diseases also, only a few persons are affected in a manner justifying the idea of contagion or infection; whilst in scarcely any do we find the majority of those exposed affected. In those cases in which large numbers of persons in towns or districts become affected by a similar disease, the circumstances are generally alone explicable by the supposition of a general influence, such as certain states of atmosphere; by supposing that the disease is epidemic, as we term it. But here again we see the same link required; since, if there be not *some* condition of the body necessary, how is it that so many escape,—I mean of those in whom no differences as to exposure are observable.

I have just said enough to shew you how large a field of enquiry the question of contagion opens. For my own part, it seems to me that, in most, perhaps all, diseases, there is something emanating from the body, either by the skin, or lungs, separately or in conjunction, which is either injurious in itself, or becomes so when mixed with the atmosphere, or both; and that, subject to that separation of its particles which appears as a law in regard to gaseous or aëriform products, it will affect the air, as it is confined to a small quantity, or diluted by free communication with the general atmosphere: that these exhalations are more injurious in some diseases than others; and in some they are so highly pernicious as to affect a great number of people with unusual certainty, when we call them poisons. That the power of withstanding or combating these injurious actions is different in different persons, let the cause be what it may; and that where the powers are inadequate to these by some affection of the ordinary functions, then an action is set up on purpose to localize the disease, and to bring it to the surface of the body; and that this fails or succeeds with various degrees of exertion, just according to the *real* powers of the œconomy. That this is, in truth, catching the disease. That, in this effort, the diseased manifestations in the infected person are the same as in the individual from whom the disease may be said to have been caught; but that this may not be in all cases necessary: in other words, that exposure to a particular form of disease may not necessarily oblige, in a differently conditioned individual, the same diseased manifestations for its rejection, but that his constitution may do it better in some other way, or by excitement of some se-

cretion, and so on. And that all diseases of an infectious nature occur both from causes which we call epidemic, and also from contagion; but that both one and the other alike require, as the connecting link in their communication from one body to another, some particular condition in the body to which the disease is communicated.

I may here state a fact which occurred lately under my own cognizance. Five people living in a house where the drain had become obstructed, and had given rise to noxious effluvia, were affected in succession as follows: An elderly man had erysipelas and inflamed absorbents: next, an elderly woman had continued fever, with flushing of the face, suffused eyes, and deranged bowels: then a boy was seized by sore throat and inflammation of the tonsils; and, lastly, a young woman was affected by an acute attack of inflamed absorbents and erysipelas of the right arm. So far as these facts go, they are very instructive; but I cannot enlarge at present on this vast subject.

Practically, we do not find cases of erysipelas appearing as the result of epidemic causes or contagious influences, so commonly as some other diseases; but that the disease does occur occasionally under both of these kinds of influence, is, I think, with the condition of which I have spoken, indisputable. The practical inference from this applies also to all diseases;—viz. that the apartment should be kept at a moderate temperature and well ventilated; and that, as in all diseases the body is either throwing off, or attempting to throw off, something injurious to it, it is not likely to be otherwise than unwholesome to other bodies; that, therefore, sick rooms should be avoided generally by those whose professional or social duties do not lead them to visit such places; and that this caution applies with greater force to some diseases than others, and to people who are either not in fair health, or who are *unaccustomed* to such exposure.

There are two other diseases on which I would remark, in connection with erysipelas; because I think there can be no doubt but that they are essentially the same in their nature. The one is inflammation of the absorbents, which often occurs in connection with erysipelas; and the other, that case which we observe as the result of wounds received in dissection. With regard to inflammation of the absorbents, I do not expect that the identity of its nature with erysipelas will, in a general sense, be disputed. Men are divided in opinion in regard to these cases; some considering

them the result of absorption of poisonous matter; others regarding them as ordinary cases of erysipelas, or at least as occurring from a wound received in a disordered state of body, to which disordered state of body the unpleasant and sometimes fatal consequences are attributable. Now, whilst I must impress on you that I am far from denying the possibility of poisonous matter being absorbed in some cases, I must unhesitatingly avow my disbelief in its general, or even other than very rare, occurrence.

In relation to wounds in dissection, we have the following facts:—that many hundred individuals are occupied, during the winter months, nay from the middle of October to the end of April, in London alone, in dissection: that it is certain that the majority, and presumable that the whole, of these either scratch or cut the finger once during the season, either in the process of dissection or from other causes: that, averagely, scarcely one in fifty becomes affected by that inflammation and febrile excitement which sometimes follow on the infliction of these wounds. That they live in a crowded city; that their employment invariably exposes them to the daily influence of an atmosphere tainted by animal matter in various states of decomposition; that most of them come from the country; that, in many cases, their habits of study or inclination lead to keeping late hours, and in other respects are more or less irregular. That, practically, many do suffer in their general health from the influence of such causes; and that very few indeed fail to evince, in the spring, in their feelings and even in their appearance, the effect of an anatomical season spent in a large and crowded city. That although, occasionally, facts seem to point to the influence exerted by particular bodies, or to bodies dying of particular diseases, as having some connection with the production of the inflammation consequent on wounds in dissection,—yet that the contrary instances are so numerous, that, practically, no such connection can be established. Neither can we attribute anything safely to particular states of decomposition; since some of the worst cases have occurred from bodies which were perfectly fresh, and in which no decomposition appeared to have begun.

With regard to the last point, it would seem that butchers and cooks often experience effects similar to those which occasionally follow wounds in dissection. Whereas, though they are engaged in cutting animal matter, yet it is not *commonly* in a state of decomposition. It should be remembered, also, that the employment of both butchers and cooks involves many things of an injurious

tendency; and that they are both commonly found to be unfavourably conditioned when they become the subjects of accident or disease. We know, also, that sometimes the wound is a puncture by a sharp instrument; at others, a cut; at others, a graze, as by rough portions of bone, &c.; and, in a few cases, there has been reason to doubt whether any wound had been inflicted. That the symptoms are pain, swelling, redness of the limb, abscesses, lines representing inflamed absorbents, suppuration, and various febrile affections of greater or less intensity; and, in short, in various degrees of intensity or combination, all those phenomena which we remark as characterizing erysipelas, and inflammation occurring without any connection with any of the employments I have mentioned.

The difficulty, then, at which we have already arrived in endeavouring to refer the occasional consequences of wounds in dissection to the absorption of particular poisons is this—that erysipelas presents us with a similar, and in many cases with an identical, series of phenomena, where we cannot, with any reasonable probability, suppose the agency of such poison: for, not only does erysipelas occur without any wound at all, but also after wounds of all kinds—clean cuts, scratches with wood, iron, straw, clean needles, needles never before used*, and, in short, under a variety of circumstances in which we must regard the supposition of any poison not only purely gratuitous, but in the highest degree improbable. The universally admitted general connection of disordered health in the two classes of cases is also a very important similarity.

Now, if we direct our attention to the phenomena resulting from the best established specimens of morbific poison with which we are acquainted, we shall find the analogy presented with the cases resulting from wounds in dissection as imperfect as that presented between such cases and erysipelas is striking. The first thing to be observed in the consequences of the insertion of poisonous matter is the striking uniformity of its results. The stings of bees, the bites of serpents and of rabid animals, inoculation of small-pox, all produce results of striking uniformity of character. Many of these scarcely ever fail; and none of them, except in very rare instances. Their effects, it is true, vary extremely in violence; but scarely ever in kind. The exceptions are so rare as to

* Cruikshanks' Anatomy of the Absorbent Vessels, p. 43.

be incalculable; whilst, in regard to wounds received in dissection, the case is the very converse of all this—that is to say, that for one person who becomes affected, at least fifty escape: we have no parallel to this, nor even any approximation to it, in regard to any poison with which we are acquainted.

Neither is the difficulty of any attempt to refer the occasional effects of such wounds as are received in dissection to the absorption of poisonous matter, diminished by restricting the notion either to those cases in which the appearance of red lines, indicative of inflamed absorbents, is the primary symptom; for, whilst these red lines are of constant occurrence in cases where we can by no means assume the presence of any poison, so, on the contrary, they are frequently absent where we can infer the presence of a poisonous principle with the greatest probability.

In Cruickshanks' Anatomy of the Absorbing Vessels, p. 73, it is said, that "Mr. Hunter saw a case in which the skin, being pricked by a needle which had never been used before, or touched any infecting or irritating substance, occasioned the lymphatics (absorbents) of the arm to inflame and shew themselves in the form of *red lines* running towards the armpit. In consequence of this, some one of the glands was also inflamed and swelled; the patient had rigors and sickness; and all this in the space of a few minutes: he adds, I have seen also similar cases." Examples, however, of a similar kind are of daily occurrence;—I mean, where a wound having been received under circumstances by no means allowing of the supposition of any poison, the irritation of the absorbents is indicated in the manner here alluded to—red lines running up the arm, and irritation in the glands to which they lead.

Then again, the glands may inflame, under such circumstances, without any red lines indicating the irritation of the absorbents leading to them: and, in cases where the existence of some peculiar or poisonous principle is best established, such red lines are by no means constant, nor, in relation to the number of cases, are they even to be regarded as frequent occurrences; as in small-pox, cow-pox, and syphilis. Again, in cancer, irritation is often set up in the glands in the neighbourhood of the disease; but it by no means follows that there be any red lines, or that the actions in the gland shall be, in *every* case, cancerous.

But, perhaps, after all, the most impression is made by the relation of cases which appear to me to demonstrate the fact, that no

peculiar principle or poison is necessary to the phenomena observable; and that the existence of such a poison in ordinary, or indeed in other than very rare cases, cannot be inferred in the affections resulting from dissection, unless we determine to refer all the cases in which the phenomena occur to the agency of some poisonous principle, which involves suppositions to the last degree gratuitous: but I must state the facts generally, referring you to the respective works for a perusal of the cases whence they are drawn.

I had intended to make a copious analysis of Dr. Butter's valuable cases of irritative fever, and of Mr. Lawrence's paper on erysipelas, in order, with other cases, to put the whole subject in a point of view equally illustrative of both classes of cases; but I found that the space required would have been quite sufficient for a separate treatise, and which I think would be highly useful. I am reluctantly obliged to content myself with a few passing remarks.

Dr. Butter published a work on irritative fever, describing a disease which had occurred in the Plymouth Dock Yard in 1824; in which we perceive that it is impossible to regard the cases in any other light than inflammation of the absorbents, or erysipelas; separately, or in combination. The wounds received were from nails, glass, or bits of wood, slight grazes, and in short all those which so notoriously are followed, occasionally, by these affections. The book is very instructive in relation to these matters; and it shews how impossible it is to distinguish such cases from those ordinarily occurring from wounds in dissection, or many cases of erysipelas. It contained, also, what appears to me the clearest evidence that blood-letting, as a general remedy, is commonly unnecessary, and often dangerous. We find evidence here, that scarcely any patient largely bled recovered. Of twenty patients, nineteen died; and thirteen of them had been blooded. In three cases, also, recorded by Dr. Colles, but which resulted from wounds in dissection, one was bled (Professor Dease), and died; the two others recovered, but they were not bled. Dr. Bell, of Plymouth, who punctured his finger by a needle, used in sewing up a body, was largely bled, and he died also.

Dr. Butter, in relation to wounds in dissection, gives two letters, the one from Sir Astley Cooper, the other from Mr. Abernethy; but they both contain evidence of the opinion of these distinguished surgeons being opposed to blood-letting, as applied to the consequences of wounds received in dissection. Sir Astley Cooper mentions local bleeding, but does not even hint at general blood-

letting. They both, in a general sense, oppose the opinion of the absorption of morbific poison: whilst again, the one positively (Mr. Abernethy), the other inferentially, recognize the coexistence of general disorder. Sir Astley Cooper, speaking of his own case, says, "I have only once severely suffered from a wound in dissection, and then it was the result of an injury on my thumb, in dissecting a person who had been *executed the day before*. The symptoms were pain in the injured part, swelling, inflamed absorbents, enlarged absorbent glands in the axilla, irritative fever, a continued sore throat, and an inflammation, first on my left, and, after a few days, in my right knee. Medical means relieved me, but did not cure me; but *I recovered on going into the country*." Mr. Abernethy says, "I do not think that there is reason to believe that, in general, the animal matter, which may be on the instrument inflicting the wound, acts as a morbific poison;" and, as I before said, he thinks blood-letting improper. He says, also, "I have known persons die after such illness;" that is, wounds, followed by inflammation of absorbents, &c. generally, "apparently from affections of the bowels, brain, and lungs." He considers that the cases of erysipelas and irritative fever generally owe their peculiarities to the disordered health of the patient. I will here observe, that I attach great importance to all points in which two such men as Mr. Abernethy and Sir Astley Cooper agree, and especially one where they must have had such almost unparalleled experience, as in regard to that class of cases which result from wounds in dissection. There is weight in their coincident opinion, which, highly as I respect both authorities, I attach to neither separately; for reasons which, though equally honourable to both, regard the somewhat different mode of enquiry usually pursued by these gentlemen.

In my own case, the body was perfectly fresh, and the first symptoms I experienced were pain in the head and shoulder, and, subsequently, abscesses, but no erysipelas. I was very ill, and suffered a great deal of pain; but got well, although I was much excited by other circumstances at the time. I was not bled. I am sure that I have wounded myself in dissecting and examining bodies very frequently, but never suffered any ill consequence but on that one occasion. Constitutionally, the worst symptom I had was pain in the head; as regards suffering, pain in the shoulder.

The mode you should adopt in judging of the essential nature of "wounds received in dissection," inflammatian of the absorbents,

and erysipelas, is simply to place the cases related, as examples of either, side by side, when their identity will be sufficiently manifest. This, Dr. Butter's book will almost, alone, enable you to do; but it will be still more easy if you take with it any work written expressly on erysipelas; as Mr. Lawrence's paper in the Medico-Chirurgical Transactions, for example.

I am the more anxious to invite the attention of the profession to such a view of the subject, because, in connecting the treatment of such cases with that of the proper treatment of erysipelas, I believe that many lives will hereafter be saved; and because I find that the great space occupied by a full discussion of this part of the subject is inadmissible within the limits of this work. Such an enquiry would, also, I believe, furnish the student with the best preventive, in the impressive conviction which it would convey, that such security is most certainly to be found—in daily exercise, in habitual temperance, and careful regulation of the functions of the body; and in disabusing his mind from that *unnecessary degree* of alarm, which, I am convinced, often exerts a most pernicious influence in such cases.

I may now, then, proceed to consider the treatment of erysipelas; and here, if we consult authorities, we shall meet with a difference of opinion, which is at first very perplexing, but which, carefully considered, becomes less embarrassing; and which, tested by observation of erysipelas as it occurs in nature, points to the right treatment, in a manner which, whilst it doubtless leaves still much to the discretion of the practitioner in individual cases, shews very clearly the principles on which, in all cases, such treatment ought to proceed. The chief difficulty which occurs relates to blood-letting, involving the following questions:—when we should employ it? how we should employ it? or, whether we should employ it at all?

One point on which all writers agree, is this—that the treatment on which they place their chief reliance involves an agency which refers to the body in general, and belongs, in common phraseology, to what is termed the constitutional treatment; for it is evident that bleeding, purging, emetics, &c. must act by an influence directed either immediately or mediately, through some organ, to the general state of the body. We therefore (supposing that the observation of nature presents nothing to the contrary) shall be most safe, as to any reliance on authority, in concluding that we must look with

confidence only to such measures which, be their application local or not, act by an influence affecting the whole constitution; as you will presently see. It is necessary, also, if the views which I have given you of inflammation generally be correct, that the treatment should be in harmony with them; whilst the very difference of opinion of different writers, in regard to different parts of the treatment, point, as well as those in which they coincide, to two facts: first, that erysipelas is connected with some disorder of the system generally; and, secondly, that this disorder may proceed from different causes in different cases.

The evidence deducible from all writers shews also a general confidence in measures which tend to empty the alimentary canal, and to improve the secretions of the chylopoietic viscera. A general admission of the importance of measures directed to the skin is also demonstrable. Again, the evidence gathered from such sources shews, in regard to erysipelas, the universal admission of high excitement with subdued power,—excitement in the state of the heart and arteries, subdued power in the sloughing, and invariable departure of one kind or other from the processes of healthy inflammation.

It is to be feared that much of the difference of opinion, observable in the subject of treatment, may have resulted from different men having referred to different periods of a case; for nothing is more certain than that a treatment, proper at one period, may be unnecessary or even injurious at another—a distinction of great practical importance; since cases are in fact presented to us at all periods of their progress: some when the greatest advocate for bleeding would, as well as those most opposed to it, allow that it was unnecessary; others, who oppose stimulants or bark, &c. would as readily use it as Dr. Wells, or Fordyce, or any others who have written in its recommendation. All slight cases, or even those which ultimately prove severe, at their earliest commencement are examples of the former. Take the following as a glaring example of the latter:—I was sent for to a man who had received a graze on his shin from an iron grating; erysipelas had followed; and, when I saw him, nearly the whole integuments of the leg and thigh had sloughed (fascia and all) up to the trunk; and, on the lower part of the trunk, there was still a district of erysipelatous inflammation. I found him taking wine, bark, and ammonia, by the prescription of two gentlemen who had attended him previously to his sending to the Dispensary. His pulse was frequent;

tongue moist, but very much coated with a brown fur; and he was, as I thought, in the last stage of exhaustion. Nevertheless, I took off his wine, and substituted porter, which he happened to prefer. I struck off the ammonia, but allowed the bark to be continued. I had his bowels cleared by small doses of aperients and an injection; and I allowed him small quantities of beef-tea, with toasted bread, and a little boiled mutton, should he *feel inclination* for it, but not otherwise.

Any one would have agreed in endeavouring to support this man; and no one would have thought of bleeding him: yet, in supporting him, there were several modes of proceeding. I should have been as glad as any one that he could have taken wine; but I forbade it simply because I knew it must excite him; and I saw that it was not producing strength; and therefore I thought him better without it, and so of the ammonia. Of the *exciting* property of his bark I was not so certain; therefore I allowed it to be continued; and I thought porter might strengthen him when wine did not; at all events I felt the probability that it would not stimulate him so much. Before he had continued this plan forty-eight hours, he began to fancy some boiled mutton, which he was allowed to take; and when, on the following day, I saw that his *tongue had become cleaner*, I declared my opinion to the pupils that with care he would recover; and so he did, although his recovery was very slow; as well it might be, with so much repair necessary. I need not go further into that case, as I merely mention it in illustration of the difference of treatment which may be required according to the circumstances under which you first see your patient.

I need not specify particularly the treatment necessary in the various kinds of erysipelas; there is no *essential difference* in the *nature* of the disease; and the treatment will obviously appear with its appropriate modifications from that of more severe examples, or from the relation of a few cases: those cases, therefore, to which my observations are in a general sense directed, are what are called cases of phlegmonoid erysipelas, in which, whether occurring from accidental injuries or otherwise, the inflammation creeps up a limb with greater or less rapidity; and which, if it be not subdued, is followed by extensive sloughing and unhealthy suppuration in the skin, cellular tissue, or fascia, or all these parts, and which may or may not prove fatal.

The foundation of the treatment proper in erysipelas, if we are to improve that present ministering to symptoms which character-

izes the general treatment of inflammatory affections, is the sustained impression of general disorder, or disorder of *particular organs*, as its cause; and also that, as an evidence of this general fact, the *erysipelas* itself is *conclusive*.

I will at once cite a few cases illustrative of the disease in its light as well as its severer form; and also of affection of the absorbent vessels.

SLIGHT CASE OF PHLEGMONOID ERYSIPELAS, FOLLOWING A PUNCTURE FROM A PIECE OF CLOVER-HAY.

Joseph Chance, æt. forty-two, a builder's labourer, applied with phlegmonoid erysipelatous inflammation of the thumb and hand, consequent on having, in unloading a cart of clover-hay, punctured his thumb with a piece of clover. He has pain, running up the inside of his arm, and a swollen gland in the armpit. His tongue is dry and tremulous; pulse frequent; bowels costive: he was ordered to avoid all kinds of grease, fat, or butter, in diet, and to eat no meat: he was ordered to take the compound calomel pill every other night; and a saline aperient, with one-eighth of a grain of tartrate of antimony, every six hours. He did not apply again until the 23rd; and then came himself. The swelling in the axilla was less; tongue moist; says he "feels in better health;" no pain; now there *seems* some fluctuation in the thumb; but the inflammation is fast subsiding. He came again on the 29th: inflammation nearly gone; altogether better; tongue moist and nearly clean.—February 2. He complains that he is not so well; his *bowels costive*. There being still some sensation of fluctuation in the thumb, it was opened, and a small quantity of matter discharged. His saline aperient to be strengthened; and one-sixth of a grain of tartrate of antimony taken with each dose.—February 5. Bowels open; pain subsided; in all respects better. No further treatment necessary. At the next visit he was discharged well.

PHLEGMONOID ERYSIPELAS AND INFLAMED ABSORBENTS, FOLLOWING A WOUND RECEIVED BY A FALL ON SOME GRAVEL.

Edward Hardy, æt. forty, reports himself temperate, but much exposed to all weathers, in his occupation, that of a hawker of fire-wood.—June 24. He says that, a few days since, he fell down

on some gravel, which slightly injured his hand. His tongue was white; pulse quick, but feeble; bowels open. He was discharged a fortnight ago from an hospital, where he had been on account of a "rheumatic fever." His nervous system seems very excitable; and says he is easily "flurried." His hand is very much swollen, and of a dusky red; a portion of which redness extends up the inside of the arm to the axilla, where there is a swollen gland. Suppuration has already taken place in the hand, which is still discharging. He was ordered low diet; no meat; poultice; leeches; and rest; and a saline aperient, with one-eighth of a grain of tartrate of antimony.—June 28. His tongue still white, but moist; *bowels purged;* pulse 110, sharp and frequent; inflammation of the arm *more vivid*: has *eaten meat,* notwithstanding the injunctions to the contrary; and his appetite is defective. To omit his mixture for a day; to repeat the leeches and poultice; to lay his arm on a pillow, and not to come out.—29th. Much the same. —July 1. In all respects better; inflammation nearly subsided; says he has taken nothing but gruel; and has been otherwise strictly attentive to the directions given him. Discharged well on the 11th.

CASE WITHOUT ANY PREVIOUS LOCAL INJURY.

Thomas Wilcox, æt. forty, residing in Featherstone Street, St. Luke's, employed in an iron foundry, first found his hand tender on the 8th of February, not having received any wound or other injury thereon; the next day had pain shooting up his arm, and swelling in the axilla. His bowels are very confined, and he confesses that he is accustomed to drink spirits freely. The whole hand is now swollen; there is pain extending up the arm to the axilla: he has been, however, trying to work a few days since the first occurrence of the pain in the hand. Tongue white, pulse frequent and pretty strong, particularly in the affected arm; he is ordered jalap gr. viii, and calomel gr. i, every three hours until his bowels are opened, and a pill at bed-time, containing calomel and ipecacuanha, two grains of each; a poultice of bread and water to the part; gruel diet, and rest. This was on the 15th and 16th; bowels open three times; arm easier; there seems an obscure fluctuation in the hand; made a moderate incision and let out a very small quantity of matter, about a teaspoonful only; ordered a saline aperient with one-eighth of a grain of tartrate of antimony, and

leeeches, which, however, he is not to apply unless his arm gets worse.---20th. Is worse, notwithstanding that he has put on the leeches: hand much inflamed; pain and tenderness at the arm increased, and threatening extension of suppuration of the hand. Notwithstanding the injunctions given him as to diet, he now says that he has *been eating veal and bacon*. Repeat sixteen leeches; poultice far too small, this to be properly applied; strong injunctions to take nothing but gruel.—21st. Is better; has obeyed directions as to diet; leeches applied; arm a great deal easier; bowels open, thrice yesterday; no pain in the axilla; pulse ninety-two; ordered to continue the saline aperient without antimony, but to take compound calomel pill every night. Under this plan the pulse became steady and regular at eighty. Hand discharges very freely; swelling subsided. He was very shortly after discharged.

CASE OF IRRITATION OF THE ABSORBENTS.

Lucy Doren, æt. sixty-two, applied July 8th. Has a collection of matter at the root of the nail of the middle finger, consequent on working with a thimble which pressed on an agnail. There is pain all up the arm; this is very violent, and prevents her from getting any rest. There are two swollen glands in the axilla; tongue dry and white; bowels costive; has taken salts, but they have not operated. An incision is made through the skin and a small vesicle, from which a small quantity of moderately healthy-looking matter and a little serum is discharged. A linseed-meal poultice to the part, and a saline aperient with one-eighth of a grain of tartrate of antimony every six hours. Did not come again for a week, when the finger was nearly well; wished to give up her letter, but I advised her to keep it a few days longer; tongue nearly healthy; she continued a few days and was discharged.

CASE OF SEVERE PHLEGMONOID ERYSIPELAS FROM A GRAZED WOUND OF THE LEG.

A gentleman, æt. thirty-eight, very stout and plethoric, and accustomed to full living, desired my attendance on account of active phlegmonoid erysipelas of the leg. A few days since he had grazed his leg in getting out of a cabriolet, and had sent for a

medical man, who had applied some leeches, a poultice, and given him aperients. His leg, however, had got worse, and I found that he had not been attentive to his diet, having already dined off cold beef and salad when I saw him. The foot is much swollen, and above it, extending over the calf of the leg, there is inflammation of the dark-red character of phlegmonoid erysipelas. In one or two districts there are small granular-looking points, indicative of vesication, and the dark, almost black appearance beneath seems to render sloughing unavoidable. The inflamed parts are firm and elastic, except in some parts of the foot, where it pits a little on pressure; the wound is scarcely discoverable; his tongue is moist at the sides, but elsewhere rather inclined to be dry, and covered with a dark-brown fur; his pulse strong and full; his abdomen large, and a fulness about the region of the liver. Gruel diet, bread poultice, twenty leeches to the leg, four grains of calomel and three of the pulvis antimonialis, with some extract of rhubarb, immediately; this to be followed by saline aperients, with a grain of the tartrate of antimony, every four hours. The next day, July 13th, he has discharged an immense quantity of *dark fæculent* matter from the bowels; leg less swollen; foot still inflamed, but does not pit on pressure so much as yesterday; pulse not so strong; he feels better: to continue the mixture, and to repeat the pills to-morrow night. Propose to visit him the day after to-morrow; but he is to send if he is not so well.—15th. Tongue cleaner, bowels open, secretions healthy; leg much better, but two or three patches are evidently sloughing; but the rapid improvement in the inflammation seems to suggest that the sloughing will be superficial.—17th. Sloughs separating fast, and granulations are already observable at the edges; the sloughs are evidently superficial; in all respects doing well; the tongue, however, is rather foul at the back part, and he has a good deal of pain when he attempts to move the right knee (the erysipelas is in the left leg); the right knee is a little swollen on each side of the patella, apparently from effusion into the bursa; it is not tender nor discoloured: to continue his remedies; gentle friction to the knee.—19th. Sloughs separating fast; erysipelas nearly subsided; tongue clean; pulse nearly natural, retaining only a little sharpness. The further progress of the case may be stated in a few words: he continued rapidly to improve, and, on the 25th, I discontinued my attendance, leaving him quite well; and, indeed, I might have left him before this, but that, as he recovered, I found him rather disposed to return too

quickly to his usual habits. The slough, notwithstanding the first aspect of the case, proved very superficial; the affection of the right knee subsiding nearly as suddenly as it had occurred.

I never saw a case more beautifully illustrative of the treatment of erysipelas by influences directed to the disordered functions than this. The patient was strong and plethoric, and the inflammation very violent, and just such as I have often seen rapidly followed by the worst symptoms. In such a case as this, when a a man begins to move about you should support the vessels of the limb, at first, by a well-applied bandage, which was done in this instance. I believe all advocates for bleeding would have largely bled this patient.

SEVERE CASE OF PHLEGMONOID ERYSIPELAS, TREATED BY THE CORRECTION OF DISORDERED FUNCTION, OCCURRING WITHOUT ANY LOCAL INJURY.

A girl, of about twelve years of age, of unhealthy aspect, was brought to the Dispensary, with the left arm affected by phlegmonoid erysipelas; the inflammation extended from the elbow to the shoulder, and posteriorly to the junction of the arm with the back. The inflammation was of a dark-red colour; the whole arm was extremely swollen to the fingers, but *very tense and elastic*, and affording the sensation of extensive effusion into the cellular tissue throughout. She had been to St. Bartholomew's Hospital, where she had been ordered poultices and leeches; but the inflammation had continued to get worse, until it reached its present condition. The tongue much furred and yellow-brown; the pulse sharp and frequent, 120; the bowels habitually costive, and there had been now no evacuation for two days. On inspecting the back part of the shoulder, there appeared small spots of vesication, and a state of subjacent skin which appeared to threaten mortification. The girl was very feverish and ill; in short, it was altogether a severe case.

Regarding this as a case calculated to test strongly what I believed to be the real nature of erysipelas, I ordered no leeches nor other bleeding; made no incisions at the time; but I ordered the child to have nothing but gruel; and I proceeded to act on the bowels by continued small doses of jalap and calomel, with subsequent injections of warm water. The next day the inflammation

had undergone no very marked change; if any thing, it was rather better; nor did the threatening vesications appear to have advanced; the tongue moister, but still furred; she said she had less pain, and the powder had produced several evacuations of a dark colour and very offensive. I should mention that her mother had allowed her to take a raw apple; having severely lectured the mother on the impropriety of disobedience in a case which threatened her daughter's life, I desired that the powders should be continued, but at longer intervals, so as to keep up occasional discharge from the bowels; gruel continued. The next day (Sunday) I did not see her; but a gentleman, who undertook this duty, finding the inflammation on the wane, made no alteration in the treatment. Monday, I saw her; she was in all respects improved; the swelling and inflammation much less; there appeared no attempt at vesication; but the dusky-red was more vivid in that situation than elsewhere. The girl seemed very weak, but certainly not so much so as she did on her first application; she had had some comfortable sleep also. Tuesday: inflammation still less; and, on examination, a deep-seated fluctuation, as we thought, was perceptible. I now made a moderate-sized opening with a double-edged knife; and by this opening a very large quantity of matter escaped, at first streaked with blood, but followed by apparently healthy pus. The following day the child was ordered to take a little animal food, and got well without any further treatment, except a weak infusion of bark with mineral acid. I should mention that, after the third day, the evacuations from the bowels became natural.

Now here was as bad a case of phlegmonous erysipelas as is often seen, in a very unhealthy subject. The biliary secretions and the functions of the bowels were obviously disordered; the means directed to cure the erysipelas, and which were completely successful, were the correction of the functions in question.

Another remark I have to make in this case,—viz. its termination in abscess. This is not, as we all know, the ordinary course of such cases; but this is not the only case which induces me to believe that the characteristic terminations of unhealthy inflammation, when it has proceeded too far to be made to subside (or terminate, as we call it, in resolution), may be changed to an approximation to healthy processes.

The next case in some measure illustrates this, as it does those insensible gradations by which erysipelas and carbuncle are

connected. In relation to erysipelas in children generally, my own experience leads me to think that the bowels are commonly in fault. When properly treated, they in general terminate very favorably: but I have no experience as to what would happen if bleeding, even by leeches, were *liberally* employed in such cases. Many years ago, I saw a fatal case of erysipelas in a very unhealthy and emaciated child, about six years old; but I do not recollect any other example; nor do I remember the particulars of that case, further than that the patient had been much affected by scrofula.

I was sent for, a few miles from town, to see a gentleman who laboured under inflammation of a phlegmonoid, erysipelatous character, on the left side of the neck, extending upwards, behind the angle of the jaw, and who, besides this, was exceedingly ill. He was a remarkably firm, sensible man; but I found his nervous system in an exceedingly disturbed and depressed condition; and, when I entered the room, he could not refrain from shedding tears. He was naturally of a bilious temperament and sallow complexion, and had been ailing for some time previous to his present attack, which appeared to have come on the day subsequent to his having eaten a rich dinner—a thing unusual with him; his habits being generally very moderate, and, as regarded drinking, most temperate. His pulse was soft, but sharp and frequent; his tongue was coated with a black fur; his secretions exceedingly wrong; those of the bowels (which had already been opened) being black and fœtid; his urine uncommonly thick, and depositing a copious, reddish-muddy sediment; his nights sleepless; and the skin and conjunctiva sallow. There was a dark-red swelling, of a diffused character, on the side of the neck, of a fiery, phlegmonoid, erysipelatous character. The centre of this swelling corresponded to the angle of the jaw: it was tender; but, notwithstanding its excited appearance, it was not *very* painful. I ordered him to poultice* the part, and to take four grains of calomel, with four of antimonial powder, and about six grains of jalap; and I also provided him with a prescription, of which he was to take, on the morrow, a wine-glassful, every six hours, according to circumstances, containing six ounces of infusion of calumba, with three drachms of ipecacuanha wine, and gruel diet.

The next day, he had taken one dose of the mixture only;

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* Bread and water.

the bowels had acted, the secretions being very dark; and he seemed more tranquil. The local disturbance was much the same. I ordered a dozen leeches to the part, and the powder to be repeated, with one grain less of the calomel, and to put his feet in warm water at night. The leeches bled freely; as on yesterday, he feels a shade better; the erysipelas was not visibly altered; and the secretions were still very unhealthy. I ordered a mixture of equal parts of infusion of senna and calumba, with manna, every six hours, and to repeat the pills at night.—To-day, January 5, he is much better; his secretions are improved; the skin has acted freely in the night; the erysipelas is also better; that is, it has not extended, and, in the circumference, is less violent. I ordered him to omit the calomel, and to take pil. hydr. pil. aloet. soap aa, five grains at bed-time; frictions to be made on the region of the liver; and the mixture to be continued.—6th. The secretions improved, but still dark; the urine also is better, but still much loaded; the erysipelas varies, but is not essentially altered, except that there is evident tendency to a diminution of its diffused character, although the amendment, *from day to day*, is so small as to be scarcely perceptible. He is certainly better; and, as he complains of want of rest, I ordered him to take five grains of the extr. of hyoscyamus at night, in addition to his pill of aloës, &c.—January 7. He has passed a miserable night; has perspired very little; and his nervous system more disturbed again: he is altogether not so well this morning. He was ordered to repeat his pill, without the hyoscyamus, but to add to it two grains of ipecacuanha.—8th. He has had a more quiet night; his skin has acted well; and he is better this morning. The inflammation is less diffused; but the tumour is very vascular, and dark towards its central part.

It is interesting to observe the changes in the local disease, and how these vary with his general condition. The inflammation has been losing its diffused character; but, in other respects, it has varied considerably; sometimes looking less red, as if resolution even were not *quite* hopeless; at others, assuming an aspect of malignant carbuncle.

I now ordered him empl. ammoniaci cum hydrargyro to his side, and injections daily to the bowels, which he had taken two or three times already.—9th. The tongue is much cleaner; the tumour less vascular; the pulse regular, about eighty, but weak; and the secretions improving: he perspires profusely at night; gets some sleep; and is otherwise not restless: the urine is greatly

improved, and the countenance less sallow. I directed the pills to be repeated; but, as he seems weak, to omit the ipecacuanha.—11, 12. He continues to improve; but the tumour at times has become painful.—13. I thought, this morning, I could feel a deep-seated fluctuation; I therefore made a free incision, and very deep, giving exit to pus of a healthy character, but the very thickest I ever saw. The diminished size of the tumour now discovered a smaller collection of fluid, which did not appear to communicate with the larger cavity. I therefore made another incision, and evacuated another collection. There was some sloughy cellular tissue, and a little blood also, discharged. The matter was received in different vessels and also on sponges; so that I cannot say the quantity; but it must have been very considerable. The pills and the poultice to be continued.—14. The patient is better; he has had the best night he has had at all; his tongue is still cleaning, but very foul, and yet black in the centre; it has always been moist. I ordered him to try a little beef-tea or chicken-broth; but cautiously.—16. He is going on well; his tongue is cleaning. I had suggested some infusion of bark, with dilute acid; but, as he saw I laid not much stress on it, he took only one dose of the mixture.

I need not continue the case; but may at once add that he daily improved, and that his treatment consisted in a *gradual* return to his usual diet, and a gradual withdrawal of all medicine. One day, his bowels being torpid, he took a little lenitive electuary, with three grains each of rhubarb and jalap, to give it the required activity. He came under care at the commencement of January: he was perfectly well on the 28th; the swelling having gradually subsided, and the openings healed, except that, in the larger one, a piece of black sticking-plaster was still worn over a small point not yet healed.

The points in this case which interested me were the presence, for the most part, of so little pain in an inflammation of as bad a character as I ever saw in any carbuncle (with the exception of the case of anthrax to be related in connection with that subject). At various periods, it might have answered equally well the descriptions of phlegmonoid erysipelas, carbuncle, or even, at one period, anthrax. The evidence of hepatic disorder might have suggested the more active employment of mercury, as calomel; but, finding that the liver did not refuse to secrete (though but sparingly at first), I preferred mild doses of the blue pill, trusting to the efficacy

given to them from measures directed to the skin and bowels, of a gentle kind, arising from the sympathies of these organs with the liver; and endeavouring to avoid unnecessary depression, or a tedious convalescence, or both, of which, in this patient, I was equally apprehensive. I was also, in this case, particularly desirous of avoiding opium; for the secretions were in such an unusually depraved condition, that I thought his safety would be entirely compromised by the slightest check of them; although not copious, still they were not suspended; and the tongue, though as black as it ever is in the last stages of typhus fever, was always moist. The effects of the hyoscyamus strengthened my fears with regard to opium. The injections appeared to produce very comfortable effects. I began them first, when, on one occasion, I observed the skin improved in appearance, without the secretions from the bowels being very satisfactory as to quantity; and they brought away, as indeed I predicted they would, a large quantity of dark secretion. As the leeches appeared to do no good, and as I was convinced we had no strength to spare, and that they did not minister to the cause of the disease, they were not repeated. The moment his secretions progressively improved, he was allowed very small quantities of nutriment; and, although the disease was severe, and threatening the worst consequences, he can scarcely be said to have had any period of convalescence, which I attribute to his unflinching adherence to the directions given him, and the avoidance of unnecessarily severe measures, or even the continuance of any, after the indications appeared to have been fulfilled for which they were employed. The gradual diminution of the diffused character of the inflammation, and its termination at last almost wholly in abscess, are to me interesting features in the case.

The foregoing cases will exemplify to you the general character of the treatment which I consider proper in erysipelas; and, although there will necessarily be particular points of difference in different cases, the principle will be the same in all,—that is, the avoidance of excitants, both local and general, and active attention to the state of the secretions. If you treat cases in this manner, and they are presented to you in any reasonable time,—for one case of danger, or even great severity, you will see a vast number which only present those characters described in the two or three first cases which I have mentioned. You must, however, in all, very strongly impress on the patient the necessity of abstinence, and only allow him weak gruel, or something of the same kind.

If he requires nourishment, this will be sufficient; whereas, if he does not, he will seldom be imprudent as to quantity of this kind of diet.

Your first object should be to clear the bowels, and to keep up gentle, but not very *profuse*, action from them; and to assist the effect this will have on the skin, by the addition of ipecacuanha or antimony. Many cases will require no other treatment: in others, again, a few active doses of calomel will be of great service, and especially in cases where the liver may be demonstrably in fault, or reasonably suspected to be so. To this you may advantageously add some sudorific; as ipecacuanha, or, still better, antimony. In some, as in a case selected in a preceding Discourse, its combination with small doses of opium will be found useful; but, generally, this is not necessary. In severe cases, should the calomel, however, affect the bowels profusely, you will obtain much advantage by moderating this effect; and one-sixth of a grain of opium, or two or three grains of the opiate confection, with two or three of calomel, according to circumstances, will be useful. I would observe that I have, however, generally tried to avoid opium, or given it in very small doses, from the fear of checking the secretions; a freedom in regard to these, as distinguished *from inordinate excitement*, being of all things most important in erysipelas. Mr. Lawrence appears to employ calomel and James's powder, in the proportion of three or four grains of each with saline aperients, with or without antimony, and according to circumstances. This is also, in active cases, very good practice. Where calomel disturbs the bowels more than is desired, and you are reluctant to employ any narcotic with it, you will sometimes find the addition of a few grains of powdered cinnamon, or some other aromatic substance, an useful auxiliary. Injections of warm water are also of great service, as I have already noticed in speaking of inflammation.

I have seen very little evidence from which I can safely draw any conclusion in regard to the use of bark or stimulants in erysipelas. Those who place so much reliance on bark, appear to me to commit the same sort of error as those who advocate bleeding and evacuants *as such*. The former look chiefly to the absence of power; the latter, too exclusively to the presence of excitement: the true view is, that which combines a sustained impression of both. I would by no means, however, assert that, in certain cases, the exhibition of bark may not be useful; whilst in any which we may see for the first time, when extensive sloughing has already

taken place, it may prove more useful than any other *medicine*. From the evidence of writers on this subject, and especially that of Drs. Wells and Fordyce, it appears probable that bark may, in some cases, correct certain conditions of the stomach and alimentary canal, or of the system on which the erysipelas may depend; and any thing that will do this, will become a good remedy in the case to which it may apply. It is also probable that, in different cases, and at different periods, erysipelas may be more or less connected with disorder of particular organs, though its essential characters be the same. So also the indication of want of power may take the lead in one set of cases; that of excitability in others: and again, they may be, as is the common case, pretty equally demonstrated. I think it certain that any thing which gives power without adding to excitement, would do good in erysipelas; and that bark, auspiciously administered, does this in some other cases, is, I think, not to be disputed. But then it *usually* requires some previous correction of the secretions; and this, in erysipelas, *generally* renders bark unnecessary.

I have given bark often enough in erysipelas, according to received notions; but then it has been under circumstances where I verily believe it to have been unnecessary; because I have often found patients neglecting the bark, whilst they have continued the plain, cautious, but more nourishing diet recommended on the retirement of the erysipelas; so that in private practice I seldom employ it when I can place dependance on the steadiness of the patient: when I cannot do this (in dispensary practice, a very frequent case), I prescribe either the infusion or decoction, either alone, or sometimes, if the bowels require it, with a little manna in solution. I have sometimes also thought that infusion or decoction of bark, with small doses of the dilute sulphuric or nitric acid, assisted in restoring the digestive functions. Usually, however, I regard the case at this period as really requiring nothing but a *cautious* return to a moderate diet. A due observance of this is, however, more secure, if the patients be still taking some medicine; for, if they are improving without any, it is often difficult to persuade them that the required prudence in diet is necessary.

I have thus stated what my experience has led me to think concerning bark; but I would have you take my observations in regard to that medicine with caution, and observe for yourselves those cases in which you may see it administered. As this is the first time I have mentioned bark, I may observe generally, that

wherever I have employed this remedy, I use the infusion or decoction; and I prefer this form to the quinine. I here speak of it generally, not merely in regard to erysipelas. I have often seen bark, in infusion or decoction, beneficial where the quinine, even in very small doses, produced excitement; and I have not found quinine do where bark disagreed: but then I have seldom given bark in those masses in which it is sometimes, or, at all events, was formerly, prescribed. Physicians, however, have more experience on such subjects than surgeons; I only here state the results of my own experience. In all cases of erysipelas, when properly indicated, a free opening or incision is highly advantageous; but, as this is one of the points on which I must speak a little more at large, I refer you to a succeeding page for instructions on this subject.

I must now make a few observations on bleeding in erysipelas, and also on the local measures which should be employed.

TREATMENT CONSIDERED GENERALLY.

Bleeding, as I have before observed, is the great point of difficulty with practitioners in general, in regard to the treatment of erysipelas; and here, as in all other cases, we must begin by collecting facts. Many of these are of the same kind as those mentioned in relation to inflammation generally; but with this difference,—that those which oppose the idea that bleeding is the proper remedy for erysipelas, apply with much greater force, in that they are of far more frequent occurrence. Now we find that erysipelas gets well when bleeding has doubtless been employed; we find that numerous cases also get well without bleeding: and, as regards general bleeding, the number is probably much greater than those in which bleeding has been instituted. We find also that bleeding is never trusted to *alone* in erysipelas: and more than this, that it is not only employed with other remedies, but with remedies which, when employed without bleeding, have been proved over and over again, in a great many cases, to be successful.

We find, it is true, great difference of opinion on the administration of this remedy: that is, we observe that some are decided advocates for it; some only employ local bleeding; some only bleed in particular cases; some almost entirely reject it. But we never fail to observe some evidence of caution in regard to it. There is

a practical recognition in all writers, that it is not a remedy of universal applicability: whilst the necessity of attention to the various functions, and particularly the chylopoietic viscera, is allowed by all, and in all cases; so that, when we regard the differences of opinion on the subject of bleeding, they are shaded off, as it were, from those who almost exclude bleeding, to those who are strong advocates for it: these last, however, not recommending that indiscriminate use of it, which they do in what they regard as common inflammation. Even Mr. Lawrence, who seems to employ bleeding in this complaint more freely than most others, does not appear to bleed in all cases.

Now all this is quite reconcileable with those views which *limit* the notion of inflammation to an excess of blood in a part, or of excessive action, or both. Since, with views *so* limited, nothing is more natural than that different degrees of inflammation may require different modes and degrees of bleeding, nor more consistent with them, than that *some* bleeding should take place in all. That this is the key to the greater part of the differences of opinion observable on this subject is plain: while, from the fact, that those who recommend bleeding in erysipelas, always rest their recommendation on its inflammatory character; whilst those who oppose its employment, proceed on the assumption that it is not so. Thus, Mr. Pearson, as I have shewn, is on the whole opposed to general bleeding; and, exactly in the same ratio, doubts its inflammatory character,—that is, he neither absolutely rejects either. But whilst he speaks of bleeding in large towns as seldom "necessary, or even admissible," he says the relation of erysipelas to inflammation is "very remote."

The error under which we have laboured is plain enough, and the cause of it equally so;—the cause being the absence of true views of inflammation; and the error, a notion that inflammation necessarily required the abstraction of blood. It never seems to have occurred to us that the quantity of blood in the system might have nothing to do with the matter. It never seems to have occurred to men that the views to which they limited their notions of inflammation might have nothing to do with the real cause of the process; or that this cause might involve agencies, to the removal or correction of which, bleeding might be in one case unnecessary, in another injurious. If, notwithstanding this error, however, the treatment of cases had been conducted with a view to the *legitimate* induction of any conclusion as to the effects of

remedies, it might very possibly have led to the correction of the practical error, although it might not necessarily have explained the circumstance on which it depended.

I have already alluded to many writers; but there is one of more recent date, on whose observations on this subject I must make a few remarks. Mr. Lawrence, of St. Bartholomew's, has written a paper in the Med. Chir. Transactions, on Erysipelas, in which his object seems to be to shew that it is an inflammatory disease; that it most frequently arises in persons who live irregularly, or who are not very cautious at least in their habits of living; and that the treatment is essentially anti-inflammatory, especially demanding, in certain cases, the employment of bleeding and incisions. Now, in most points, I agree with Mr. Lawrence; but there are some in which, consistently with the views which I have endeavoured to develop, I differ; and the chief of these is on the subject of bleeding. I am the more desirous of considering this point, since I think the paper likely to mislead in regard to this remedy, not only because Mr. Lawrence is justly regarded as a good authority, but for a still better reason — the general excellence of the paper. Now, were it necessary, it would be easy to oppose the authority of Mr. Lawrence by others; but this, though often expedient in an argument, is of little value in the pursuit of truth: it would help me very little in any difference of opinion, to shew that others differed also. The question is, not who differs, but the grounds on which the two opinions may rest. The general reasons on which I dissent may be gathered from the preceding pages; those having a more direct reference to Mr. Lawrence's paper I will proceed to state.

Now, supposing that we knew nothing about erysipelas; supposing that we had never even seen a case of this disease; it would be exceedingly difficult, with any approximation to inductive reasoning, to conclude, from Mr. Lawrence's paper, that bleeding was a good remedy in its treatment. We might *possibly* infer from the paper in question, that it was not necessarily injurious; that, in some rare cases, it might *probably* be necessary; that in others it was disadvantageous: but we could not, I conceive, in conformity with the ordinary rules of induction, by any means establish a well-grounded confidence in this remedy. You should read the paper cautiously, and you will then see how far my observations are reasonable or otherwise; and I particularly wish this, from my limits not affording me the opportunity of making that ana-

lysis of the paper in question which its general excellence deserves. I will, however, make a few remarks on it.

We observe that the bleeding was employed, in conjunction with other remedies, with remedies that exert a very powerful influence in the relief of erysipelas; and that, too, in cases where no bleeding has been instituted. I must, however, guard you from supposing that Mr. Lawrence advocates the indiscriminate use of bleeding; on the contrary, the following passage, although it seems, taken with the whole paper, to refer to exceptions rather than the rule, in a practical sense, though in a limited manner, fully recognizes the true principle on which the complaint should be treated. "The disposition* of erysipelas," says Mr. Lawrence, "to terminate by resolution, is another reason against resorting indiscriminately to active depletion. In many cases, the disease passes through a certain course, and ends spontaneously; it is sufficient to put the patient on low diet; to cleanse the alimentary canal; and then to use mild aperients and diaphoretics. When it proceeds, as it often does, from unhealthy conditions of the alimentary canal, the removal of the internal disorder leads to the cessation of the local complaint. It must be observed, however, that venæsection is sometimes useful, both in curing the internal causes of erysipelas and in promoting the termination by resolution."

Now, an *extension* of the view, unfolded in the first part of this passage, is really, I believe, the right treatment; but, nevertheless, it is impossible not to perceive that, in a practical sense, Mr. Lawrence is to be regarded as an advocate for bleeding, and that in no very measured manner. For example, in case the 8th, a man of fifty years of age, of a robust and plethoric habit, &c. receives a slight wound of the scalp from a fall, on which erysipelas supervened, and for which he had been thrice bled to the extent of twenty ounces "on each occasion," and subjected to the other parts of the antiphlogistic treatment. Mr. Lawrence adds, "when I saw him, at the end of this time, the scalp on the left side of the head was slightly red, and raised into a general elevation, apparently by matter diffused, through the cellular texture under the aponeurosis near the wound, and by serous effusion in the circumference. There was a small opening through the inflamed and swollen scalp, on the left parietal bone, the original wound, and another about three inches further back, which had been made to let out matter.

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* My experience leads me to doubt this "disposition" (treatment apart).

Through these, a well-formed pus could be squeezed; the face was red and swollen with erysipelas; the tongue was of a dirty-white all over, and rather dry; the pulse full, but not very strong. As the openings were manifestly inadequate to the discharge of matter which could be pressed towards them from a considerable distance, and as the suppuration was extending under the aponeurosis, I laid the two apertures into one, dividing an artery which bled freely. This was allowed to bleed on, as I thought a *further loss of blood necessary*, although the patient was averse to the measure. The bleeding was continued until the faintness came on, when the artery was tied. The blood which had been caught in a basin amounted to more than twenty ounces (two grains of calomel with two of James's powder were given every six hours; saline medicine, with saline aperients; *milk diet).* Mr. T. slept well; was much better the next day, the tongue being particularly improved. He continued the medical treatment, with slight variations; the inflammation and suppuration of the scalp were arrested; but the erysipelatous *redness and swelling* passed over to the *opposite side* of the face. In about a week, he began to take the *subcarbonate of ammonia*, and he recovered quickly and completely."

This case is very interesting. A man, in whom we might certainly have expected most benefit from blood-letting, and whom many people would have bled in some shape or other, loses sixty ounces of blood, and is subjected to a general antiphlogistic treatment, without, so far as we can see, receiving any benefit from it. Matter forms under the scalp, which, appearing confined there, is very properly evacuated by a free incision, from which he is allowed to lose twenty ounces more. Now he has calomel, &c. as related. I can see no clear evidence of the good effects of bleeding in this case; but it is probable that the free opening was of great service: the reader, however, may form his own opinion. In other cases, the difficulty of adjusting the influence of blood-letting depends on the simultaneous employment of calomel, antimony, and saline aperients; all of which exert great, and I should say a much greater, influence in this disease than bleeding; calomel and antimony more especially: not only, in a general sense, by the determination to the surface, and the power of equalizing the circulation which they evince, but also by the effect they produce on an organ so frequently at fault in these cases as is the liver.

If the object were to obscure the effect of blood-letting in erysipelas, you could evidently not do so more effectually than by

employing with it such remedies as are known to possess *most power* when employed *without* blood-letting; and, for my own part, I know not any that answer this description so well as calomel, antimony, and saline purgatives, in their *general* application. I wish to impress this the more on you, because I believe it to be one of our greatest errors; whilst it is quite fatal to all inductive reasoning. Undoubtedly we labour under great difficulties in severe cases: we are anxious to leave nothing undone which may be beneficial; and we are *too apt* to regulate our treatment by what is regarded as conventionally the best of the day, than to reflect for ourselves on the indications of the individual case. But, in hospitals, we have peculiar advantages in substituting more rational modes of practice; and opportunities not only of controlling the imprudent interferences of patients, but of watching the effect, and of immediately superadding any part of the treatment which a more inductive mode of proceeding may have left unemployed. Even in dispensary practice, encompassed with difficulties, and harassed by vexations, of which those who have not experienced them have little idea, considerable approximations may be made to a practice allowing of a more close mode of reasoning; as I hope to shew in relation to various diseases in due time.

I add one more case from Mr. Lawrence's paper. The case is headed Erratic Erysipelas, treated by Venæsection. "Wm. Mc Donald, æt. sixteen, came into St. Bartholomew's Hospital on the 30th of September, 1826. He had been discharged from the hospital only a week since, having had a lacerated wound of the arm, which was nearly healed. He has since been indulging himself with a *very full diet*, and has used *the arm freely:* violent inflammatory fever, with erysipelas of the arm, has taken place.—September 30. I ordered *immediate venæsection* to twenty ounces; senna mixture; and, afterwards, saline draughts with antimony.— October 1. *Redness and inflammation rather increased.* Repeat the venæsection to fourteen ounces; three grains of calomel every eight hours. —19th. The erysipelatous redness *gradually spread over the head, the trunk of the body,* the opposite arm, and the lower limbs, subsiding in one part, and spreading successively to others. He was kept on low diet. The saline medicine was continued without the antimony, the latter having made him very sick; occasionally, purgatives were employed, and he gradually recovered. The extent and continuance of the disease, and the consequent reduction of strength, excited great alarm for this patient; but the expression

of the countenance, and more particularly the state of the eye, as well as the voice, were natural throughout. The disturbance of the system was always inflammatory during the whole progress of the case; the pulse excited; the skin hot and dry; the tongue white. Neither bark, ammonia, nor any other stimulus could be borne; every trial of such means, however cautious, aggravated the disorder. The recovery of strength on the cessation of the inflammation was very rapid."

I confess myself entirely at a loss to perceive the evidence of this boy having been at all benefited by the venæsection. It seems to me that Nature here spoke so emphatically, that (the bleeding apart) the case was treated, in the main, properly. The erysipelas sets in, on a wound nearly healed, after a full diet and free motion of the part: and, whilst the weakness of the boy on the one hand seems to have prohibited any further extension of the bleeding, his excitability on the other rendered ammonia, bark, &c. experimentally inadmissible; so that, in fact, the treatment became resolved into that which struck at the cause; viz. aperients, low diet, and rest of the part, which last, though not mentioned, I take for granted: whilst it is not unreasonable to suppose that the bleeding (recollecting that it was a boy of sixteen) might readily enough contribute to his debility; as it certainly did in a case mentioned in a former discourse. Compare this case with the case mentioned in the previous discourse (page 379). So, in regard to the cases treated by incision, we have, in case 25, a pretty good evidence that the bleeding did no good. I would also direct attention to those cases in which bark or stimuli were employed, with a view to the consideration of the circumstances which rendered them necessary; and, in fact, to the whole of Mr. Lawrence's paper, which is altogether the best that I know of: and, in pressing your attention to it, I do so, first, for the reasons already assigned; and, secondly, because I would protest against any conclusion being formed *on that paper* without the *perusal* of the whole of it, since you may not arrive at the same conclusions which I have done. But I cannot help thinking that bleeding was employed very unnecessarily, on the evidence of the cases themselves; and that Mr. Lawrence would think so too, were he to conduct the treatment of a few cases in the manner and on the principles which I have already described as applicable to inflammations generally. You will, however, perceive that my doubts, in regard to the neces-

sity of bleeding, must naturally be increased by the results of my own experience*.

Now, in relation to erysipelas, I have seen as much of it as most people; for, whilst few have had better opportunities, I trust I have not been idle in relation to their cultivation. I believe I have seen the disease in every form, and under almost every variety of circumstance, and have had to treat it under various difficulties, in dispensary practice, which we seldom experience in private, and which is altogether unknown in hospitals. In a very large, poor, and populous district, like that included in the Finsbury Dispensary (singly considered), by far the greater field of my observation, it may be readily conceived that, in seventeen years, I must have seen not a few bad cases also. When I began practice, I felt strongly impressed with all that Mr. Hunter had written (which was then published), and which Mr. Abernethy had taught; because both one and the other appeared to me to be more like common sense than anything I had seen or read elsewhere, and therefore more philosophical. Above all, I was impressed with nothing more strongly than the distinction (on which both these distinguished ornaments of the profession so strongly insisted) to be made between excitement and power, of which every case of erysipelas afforded an emphatic demonstration. Moreover, I soon perceived that excitement and power were not only very distinct things, but that, as power diminished, excitement seemed often to increase, as if it consisted in an endeavour to supply the place of power. I soon found, also, plenty of examples illustrative of the influence on all diseases exerted by derangements of the digestive organs, which I saw often, and indeed generally, produced excitement, but which always diminished power.

Notwithstanding, therefore, that I regarded erysipelas as essentially an inflammatory disease, it will not be wondered at that I was rather careful in regard to the abstraction of blood—a due quantity of which I believed to be necessary to power, and which I soon found was much more easily withdrawn than supplied. With these notions, in some cases, I bled pretty freely; but this happened but seldom: in other cases, I left bleeding out altogether;

* Although the text sufficiently declares my own opinion, yet the student should always be guarded when an author points to any sweeping generalization. There *may be* cases requiring bleeding in the manner recommended by Mr. Lawrence; I do not meet with them; and I am disposed to think them *very rare*.

in others, I delayed bleeding, but often with great anxiety and labour, from the vigilance it necessarily implied, lest I should have omitted a remedy which ought to have been employed; whilst, in all, I paid great attention to the digestive organs, which, though at first of a general kind, still included very spare diet, open bowels, and generally measures having for their object the reduction of action and determination to the skin; as tartrate of antimony. But the course of experience gave me more confidence; since I not only found cases do well without bleeding, or with such bleeding as leeches only afforded, but even those in which I bled, inasmuch as I employed other remedies at the same time, often led me to doubt whether much benefit really resulted from the bleeding.

Then, again, I saw many cases elsewhere; and it appeared to me that a much greater success attended generally on treatment which either implied only a very measured abstraction of blood, or in which it was altogether withheld. I saw patients dying of erysipelas not very unfrequently; whilst those in the dispensary very rarely died; and, in almost every instance, the fatal result was clearly referrible to gin-drinking, or other equally gross violation of the injunctions I had given. I recollect a case in which a very severe erysipelas of the arm, threatening mortification of the whole member, was progressing most favourably (as severe a case as I ever saw or read of) under spare diet and an improved state of the secretions, when, all at once, affairs which had been going on so prosperously were changed by an alarming exacerbation of symptoms. The inflammation in twenty-four hours had recurred with unusual vehemence; the patient had become delirious; and, as it appeared to me, past all hope. I sat down to investigate the causes of this sudden alteration; and, although my questions were pressing, still the people about the patient could not, or would not, afford me any explanation: at length, a woman came in, who declared that the patient, to her knowledge, had taken half a pint of gin and a pint of porter, which then the other persons also acknowledged. This patient soon sank into a state of torpor, and died. It is difficult to say much of our own practice without the appearance of egotism; but I can very safely affirm, that, where my injunctions have been followed, I have very seldom seen erysipelas fatal; and I state this with the less hesitation, because, although my public practice has been solitary in regard to its responsibility, in former years, to a degree often highly painful,—yet it has never been so as regards the presence of plenty of witnesses. I know not that

ever I treated a severe case of erysipelas which has not been observed by at least two or three pupils, and often by practitioners also, who occasionally pay me visits at the dispensary; so that the number of persons who have seen both the general practice and the general results, of about seventeen years, is very considerable. I bleed in erysipelas now very rarely, otherwise than by leeches, which, in many cases, seem to check the inflammatory actions, and give time for the operation of remedies which strike more at the cause of the disorder. I do not say that general bleeding may never be necessary; you do every now and then see cases where a generally full habit seems to suggest the expediency of this remedy. If you do bleed, I think you will do best by bleeding so as to make a decided, but *quick*, impression on the action of the heart and arteries, not regarding quantity so much as this effect; but, if your bleeding does not obviously and materially influence the inflammation, be careful how you bleed again; for it is my firm opinion, that, in the vast majority of the cases, you will do harm: you will either risk your patient's life, or render his recovery protracted, and requiring wine, bark, &c.—not as the consequence of the disease so much as of your treatment of it.

In no case should I bleed at the commencement; because I am certain that in those which, according to received notions, most strongly suggest the remedy, it is often unnecessary: and I never can believe that any remedy which is unnecessary can be otherwise than more or less injurious; still less one so powerful as abstraction of blood. The quantity of blood which the system will bear the loss of, under circumstances of excitement, is surprising; and I feel certain that this is the reason why so much advantage has been attributed to the remedy: apparent present impunity is mistaken for advantage; and the prospectively injurious debility, due to the bleeding, referred to the erysipelas. In my own practice, I seldom repeat even leeches where one liberal application of them (from twelve to twenty or thirty, according to the case) has elicited no improvement; but they are very useful as *checking* inflammatory excitement, whilst they produce, in their ordinary application, very little reduction of power.

The connection of erysipelas also with disorder of the general health has been so often demonstrated, that I now know pretty well what to expect, although the local demonstration be but slight. I recollect one case, which was not under my treatment, of a man who came to my house one morning with a wound in

his thumb. He was a butcher; and, in endeavouring to stop a pig, one of the tusks had grazed his thumb, and there was a small patch of erysipelas occupying the circumference of the site of the wound. I observed that the man's countenance was sallow, and particularly unhealthy. I was therefore very particular in my directions as to what he was to do, and especially in regard to keeping at home. I heard no more of him; for, not knowing, it seems, that he might be visited, he had not sent his letter as the printed form on it directs; he had availed himself of the services of some gentleman who was attending a patient in the house where he lived. Now, on Friday, the day of his application, I said to the pupils, on his leaving the room—"There, now, is a case apparently very trifling; but it would not surprise me if that man died." On the Tuesday following, when I went to the Dispensary, not having heard anything of the man, I made enquiries for him, when I found that he had died that morning, having been attended by another surgeon, as already stated.

The local treatment of erysipelas should first consist of absolute quietude of the part, and the envelopment of the inflamed surface, and that in its immediate vicinity, in a soft, well-made bread-and-water poultice, made without any addition of oil or grease, or anything of that nature. I avoid cold applications; they give a check to the actions at the surface, without acting on the cause of them; and, except when the feelings of the patient *strongly* suggest their trial, should be regarded as neither useful nor safe. Of leeches I have sufficiently spoken. In regard to incisions, so much spoken of in erysipelas, they are, in many cases, of the greatest advantage; although I am somewhat unfortunate in not being able to agree entirely with either of the two gentlemen who have written chiefly in their recommendation—I mean Mr. Copeland Hutchinson and Mr. Lawrence. The former makes a number of small incisions: he says they may be "about an inch and a half in length, two or three inches apart, and vary in number from six to eighteen, according to the extent of the surface the disease is found to occupy." I cannot perceive the advantage of this proceeding; and I feel certain that it is unnecessary. It increases the pain, and affords additional risk of dividing arteries; which appears to me not to be amongst the advantages of this mode of practice. Mr. Lawrence makes one sweeping incision, seldom more than two, along the line of the inflamed part; and seems rather to run into the opposite extreme. Besides which, Mr.

Lawrence allows a quantity of blood to be lost, which, in my opinion, is neither necessary, advantageous, nor, as his own experience shews, *always* safe. The simple view which I take of these incisions, and of the advantages resulting from them, induces me to adopt a measure intermediate between the two. I see Nature labouring to determine an action to the surface, just as I do in boil, carbuncle, effusions of urine, supplying deficient power by excitement: I know that she will only do it by extensive sloughing, which requires an increase of subsequent exertion in the repair which becomes necessary. If, under treatment, I perceive the actions diminishing in the circumference, and determining to a particular spot, I either do nothing, or make a good, free opening, according as I think resolution still probable, or otherwise. If, on the other hand, I see that the inflammation is extending, or becoming increased in the site it already occupies, I make a free incision, the centre of which corresponds to that of the inflamed surface, and which may occupy a third, scarcely ever half, of the whole, fairly through the cellular tissue to the fascia beneath it, which, if also divided, is of no consequence. I know that this will unload the cellular tissue; because I know that that perfect adhesion of this structure which takes place in more healthy inflammation is not present; and, lastly, because experience has shewn me that nothing more is necessary. With regard to the bleeding, which Mr. Copland Hutchinson seems to regard as advantageous, and Mr. Lawrence in a still greater degree, my experience in erysipelas naturally makes me sceptical as to the advantage of any great loss of blood on these occasions; whilst that resulting from free openings, in *all cases* of inflammation of the surface which cannot be brought to subside or terminate in resolution, applies to all cases, and is especially exemplified in carbuncle: neither do we find, so far as I know, *any relation* between the *advantages* resulting from such openings, and the *quantity* of blood which may be lost from them. Erysipelas sometimes is not continuous, as it were; but we find the inflammation concentrating itself on more points than one, the intermediate surface being comparatively but slightly inflamed: in such cases, no doubt the incisions should be made over the respective foci (so to speak) of the inflammation. In conformity with such views, if the bleeding do not cease of itself after a few minutes, I should advise you to raise the limb, to apply cold water, or tie any vessel, the size of which may suggest the necessity of such a proceeding, which I apprehend will be very rarely neces-

sary; nor indeed any other measure beyond elevating the limb, and not renewing the application of the poultice until the bleeding shall have ceased.

I have stated that this poultice appears to me the best application; it tends to the reduction of temperature by evaporation, and also solicits the action of the skin to which it is applied; and, besides this, is generally very agreeable and soothing to the patient; and, if there be much pain, it may often be made with poppy-water or some other narcotic solution with advantage. When suppuration has become established, the linseed-meal poultice may be applied without injury. I think, in some cases, the patients find it more comfortable; but, generally, if I can ensure its being well made, and sufficiently large, I prefer the bread and water.

In all cases of erysipelas, whatever their form or their severity, the principal point is to find out the general disorder of the body on which the erysipelas depends; and, if possible, the organ most especially in fault, or most concerned in the causation. It is, therefore, so far the treatment common to all inflammations, with this material circumstance—that as the general power is less, so can you place less reliance on such measures, which (whatever their other effects may be) involve any serious diminution of that power. I cannot give you any other directions on this head, than those already offered in regard to inflammation generally, except that I would advise you to look with particular suspicion to the liver; and never neglect to examine, not only the region in which it lies, but the abdomen generally, to see if there be any tenderness on pressure. I recollect being shewn a case of erysipelas which seemed neither to progress favourably nor otherwise, but which appeared to be stationary. I found no examination of the abdomen had been made, though the patient was under the care of a very distinguished surgeon. I just made pressure on the region of the liver, and the part was so tender that it might have almost suggested the idea of inflammation of the peritonæum; yet there was no pain when the pressure was remitted.

In those cases which are chiefly marked by inflamed absorbents, with or without erysipelas of the limb, and in those resulting from dissection, I see no difference in the treatment required. The essential cause is the same,—viz. a disturbed condition of the system: but all the cautions, in regard to bleeding, apply with *especial force* to cases the result of dissection. I believe I have seen a student as demonstrably killed by injudicious bleeding, as if he had been

killed by a direct injury of any other kind. In many of these cases, independently of the general disturbance of the system, resulting from causes common to erysipelas and inflamed absorbents, when occurring under other circumstances, there is frequently superadded, that resulting from the idea of the absorption of poison, and the apprehension of danger. I am convinced that here the abstraction of blood is in the highest degree dangerous: as a most emphatic example of this, a patient, a young man, apparently strong, lost only about twelve ounces of blood, yet the effect it produced in the rapid declension of power, and the supervention of cerebral excitement, left no doubt on the minds of any who saw him (not excepting the gentleman who bled him) of the injurious tendency of this bleeding.

In the prevention of erysipelas, certain cautions appear useful, and these apply of course with greater force to all those who live in large cities, and especially those whose occupations are unhealthy. Wherever a wound is inflicted, however trifling, it should be carefully and effectually cleansed; after this, the part should be protected from the atmosphere by a piece of goldbeater's skin or sticking-plaster, and kept perfectly quiet until healed. I do not recommend this with any notion of a poison being present, but with a view to the general removal of any irritating matter which may be on the part; and especially closing the wound from the influence of the atmosphere, and keeping it quiet.

There is something in the closure of wounds which is very important. The skin evidences an elaborate contrivance of Nature to keep parts, not naturally intended to be exposed to them, from atmospheric or some other external agencies. The extraordinary difference between simple and compound fractures is in no way explicable by the mere laceration of the skin, implied in the latter, abstractedly considered. The fact also, that exposure to the air generally gives pain to an enlarged surface, is worthy of attention: it is excitement of nervous action; and if we can perceive nothing else, we can see that, in the atmosphere, we are at least applying a combination of two gases to the wound, which experience shews to be neither necessary nor advantageous. We should also be impressed with the fact, that in all these cases the inflammation shews an absence of that provision which in healthy states of the œconomy serves to limit the inflammatory process; wherefore, however small the inflammation be, yet, if it be of a diffused character, we should always be vigilant and suspicious.

My friend Mr. Wormald, Demonstrator of Anatomy at St. Bartholomew's, considers that the occasional results of dissection have occurred much less frequently since he has adopted the use of a wash, consisting of a solution of alkali. The part supposed to be punctured is washed with this solution; which he says, by the little smarting it produces, will often discover a puncture which might otherwise have escaped detection; after which the pupil is directed to wash the part. Probably cleanliness with soap and water, as already recommended, with the additions described, are the essential prophylactics: but I state the fact as mentioned to me by Mr. Wormald.

It has been recommended in certain cases, by Mr. Higginbotham, to apply caustic to slight wounds or abrasions; and also to rub caustic around the line which circumscribes the erysipelas. In some cases this seems to have done good; as regards the wound, it makes a new surface, practically for the time, around the part. In erysipelas, it so far simulates the adhesive circumscription of healthy inflammation, as interposing a different part between the skin which is affected, and that which is not so; practically, it breaks the continuity of surface as regards the identity of structure. I have no experience in matters of this kind. As having little to do with the cause, I should have no confidence in them, whilst experience convinces me that other measures are attended with less risk, and are more efficient: but perhaps they have not yet been sufficiently tried to enable us to adjust the degree of merit due to them.

One thing appears certain—that they can, in severe cases, never supply the place of the more efficient treatment; although, in interrupting continuity of surface, we can easily perceive how the caustic, applied around or above inflammation, *might*, as a subordinate measure, prove useful.

Pressure has also been applied, extending above the inflamed part; a practice recommended, I believe, by M. Velpeau: but those who have seen much of erysipelas will not be disposed to place much reliance in such a measure: whilst, if it does not succeed, it may readily, as experience has shewn, aggravate the mischief.

I have thus endeavoured to lay before you the treatment of erysipelas, by which you will perceive that it is essentially that of any other inflammation. That it consists in equalizing the circulation, in endeavours to remove the disturbance with which it is

always connected, and on which it essentially depends; and (the *particular* organ at fault being imperceptible) in measures calculated to keep the system tranquil; and, lastly, in determining to the surface generally, or helping Nature in that particular mode of it exemplified in the part inflamed.

I believe that, in most cases, the organ or organs particularly in fault are easily cognizable, if sufficient pains be taken. That, in the majority of cases, any other measures than that especially directed to such disorder will be unnecessary; and the practitioner will be presented with so few unsuccessful cases, of those seen at a remarkably early period, that, with the exception of those resulting from the imprudence of the patients, he may probably take a retrospect of seventeen or eighteen years without finding any but a few rare exceptions. I have seen cases of erysipelatoid inflammation in which the organs apparently most at fault were the stomach, and again, the kidney. In these cases, emetics, and measures soliciting the urinary secretion, would of course, in conformity with the principles I have already endeavoured to lay down, be a leading feature in your treatment; always recollecting that, if you have reason to suspect that an organ is *diseased*, your mode of acting on it should be an appeal to one or more *other* organs with which it has a community of function or a marked sympathy.

A summary of the preceding discourse will shew that it involves the following propositions:

That erysipelas is an inflammation, the characters of which are, in all cases, dependent on a disordered condition of the animal œconomy.

That this disorder may or may not be more immediately dependent on some one disordered function, or on a general disturbance of the nervous system not discoverably due to any *one* organ.

That of organs singly considered, the liver seems most frequently affected.

That the characteristics of erysipelas demonstrate the coexistence of great excitement, or great action, with deficient power.

That the treatment essentially consists in the correction of the disordered functions on which the disease depends, accompanied by measures calculated to determine to the skin.

That thus its leading feature will be different in different cases.

That bleeding cannot be freed from the objections which apply to it as a remedy, in what are regarded as more healthy inflamma-

tions; but that these are, *cæteris paribus*, of more weight in erysipelas, as it is characterized by deficient power.

That the cases in which bleeding has been employed do not afford evidence of the benefit of this remedy, which can be safely regarded as such when subjected to ordinary inductive reasoning; and (as regards the cases in question) chiefly because the remedy has been almost universally employed simultaneously with remedies shewn by experience to have greater power in the removal of erysipelas than bleeding can be shewn to possess.

That therefore, if bleeding be employed, it should be conducted with caution, and be regarded as a measure of very doubtful efficacy; as probably unnecessary, and often injurious.

That bleeding by leeches is frequently useful in erysipelas, in that it tends to check local excitement without material diminution of power, and thus gives more time for the operation of remedies which act more directly on the *cause* of the malady.

That all writers agree as to the general efficacy of remedies which demonstrably tend to tranquillize general disturbance, correct disordered secretions, and to determine to the surface; whilst they differ without end in regard to blood-letting.

That erysipelas (those cases which occasionally occur from wounds received in dissection) and inflammation of the absorbents are essentially the same diseases in their nature; because many cases are exact parallels in all their phenomena: the greater number of the facts, however, being merely referred to, as the limits of the volume does not allow their insertion. See especially Dr. Butter and Mr. Lawrence, op. cit.

That, although it is not asserted that poison is never absorbed in wounds received by dissection, the phenomena by no means justify the conclusion that this is otherwise than a very rare occurrence, whether we regard those observed in connection with erysipelas or inflamed absorbents, or those in connection with what are admitted to be poisonous principles, as the bites of venomous insects, small-pox, &c.

That there is no real difference in the essential nature of the various kinds of erysipelas, implied by the terms erythema, erysipelas erraticum, phlegmonodes, &c.; nor in erysipelas from local injury or otherwise, ordinarily termed traumatic and idiopathic erysipelas respectively.

That the chief use of incisions seems to be that of shortening a process by which Nature is labouring to bring matters to the

surface with insufficient power; and that the utility of the bleeding which may accompany them is extremely doubtful; since, in all inflammations on the surface, these incisions do good, but not in any proportion to the bleeding from them; on the contrary, that least blood follow where they are most advantageous and essential, as in carbuncle.

DISCOURSE XII.

ON BOIL, CARBUNCLE, AND ANTHRAX.

I NEED not, I suppose, again describe a common boil; but I will beg you to remark that it is a disease which is usually very painful, red, and attended with much swelling. That we generally observe that there is a sort of focus in the inflammation, this being most vivid towards the centre: that, around the circumference of such central portion, we usually feel the part very hard and firm; and that often beyond this there is a diffused redness of a somewhat lighter shade. That when it is opened, or bursts, the discharge consists of matter more or less tinged with blood, and a small portion of disorganized cellular tissue. That though the site occupied by the whole disease may be considerable, the destruction of skin is comparatively very small, and, in fact, seldom more than is sufficient to allow a free discharge for the contained matters. If these characters be increased, we have what we term a bad boil; if they be again augmented, we call the disease carbuncle.

There are, however, one or two points of difference in the physical characters of the two cases, to which I will for a moment direct your attention, and which will modify a little that view which represents carbuncle as only a bad boil, leaving, however, their *essential* characters the same. I will therefore retouch, as it were, the sketch of carbuncle which I have already given you in a former page.

Carbuncle sometimes begins in a small inflammatory elevation of the skin, a sort of pimple; more generally, perhaps, it commences by a sensation of stiffness and uneasiness in some district of the skin; this soon induces the patient to inspect the part, which is, according to my experience, much more frequently on the posterior surface of the body than elsewhere, and very commonly on the back, shoulder, or neck. The patient observes that the part is red and tender, and harder than usual. In a day or two, the

redness and hardness increase, and the pain becomes augmented, amounting in certain cases to very acute suffering. There is now a large patch of redness, sometimes of a scarlet, at others of a deeper shade, either crimson, or even with a tint of purple thrown over it; the swelling is not in general very great. The skin too has become remarkably dense in its structure, so that it feels very firm and close, such as would be compared to brawn, or some kinds of leather. He feels feverish and out of order; the tongue is furred; the pulse excited; appetite more or less deficient; his rest becomes disturbed: and this is the state in which the surgeon is generally consulted.

If the carbuncle is to proceed, the skin is opened, and generally by sloughing: sometimes minute vesicles are seen, and these are succeeded by sloughing of the skin, which is thus perforated by a a number of holes, giving a cubiform or sievelike surface, which occupies the more central portion of the disease. Through these apertures there may either be seen issuing, or may be made to issue by pressure, a little fluid of a serous kind, mixed sometimes with matter or particles of decomposed cellular tissue. The surface, however, which I thus represented as presenting a number of apertures, always sloughs; and matter, in different cases, either tolerably healthy looking, or approximating more or less to common pus, is discharged, with blood, matter imperfectly formed, and sloughy cellular tissue.

The quantity of these products thrown off at once, however, is usually not very great; but the discharge takes place gradually, in conjunction with the sloughing of the skin and the stratum of cellular tissue beneath it, to a greater or less depth as the case may be. We never obtain that simultaneous discharge of all the results of the inflammation in carbuncle, that we so commonly, indeed generally, do in boil. The skin, and cellular tissue beneath, seem to have undergone a remarkable consolidation, the effect of adhesive inflammation; a character not usually observed in boils: nor do we observe, commonly, that extensively diffused redness beyond the part which the disease occupies, in any thing like the degree in which it so frequently exists in boils. As the discharge proceeds, a very large surface is at length left to heal, of different depths in different cases; and the process of repair takes place but slowly: it, however, ordinarily progresses, if the case be properly treated, and the part ultimately heals; the patient, for the most part, feeling more comfortable than before the occurrence

of the malady, but not without (in general at least) some sensations of debility.

During the progress of the sloughing, the carbuncle usually presents a dirty yellow, sometimes grey surface, with occasionally a little blood on it, until the sloughing has ceased; and a halo, more or less regular, of dark-red inflammation surrounding it: the parts so occupied affording to the finger a sensation of that hardness and firmness of structure which I have already mentioned.

In anthrax, which is merely a severer form of carbuncle, we see little more than an extension of these characters. The inflammation occupies a larger surface; the suffering is more severe; the surface of a darker red, inclining to purple; the veins are much enlarged, and the slough and other matters discharged are of various colours, especially a dirty-grey or slate colour, mixed with a tarnished sort of yellow; the pain is excessive, and the constitution exceedingly disturbed.

The secretions in all of these cases are deranged, but, in severe forms of carbuncle, in a very remarkable manner: the tongue is dryish or much furred, sometimes both; the biliary secretion much deranged; no appetite; and the pulse is greatly excited; there is thirst; hot and dry skin, though sometimes alternating with perspiration. If the patient sink, the excitement continues, whilst the power declines; the tongue becomes very dark and black; he wanders, and at length sinks into a kind of torpor; and, in fact, dies in all respects like those do who are said to die of typhus fever.

Carbuncles are of different dimensions, from the size of a crown-piece to several inches in diameter. In the country, where very depraved conditions of the body are sometimes combined with considerable power, the inflammation is occasionally very severe and extensive. I recollect seeing a stout farmer once, who had the whole of one of the nates one mass of slough; it was a very severe case, and he recovered with difficulty.

With regard to the constitutional disturbance on which these diseases depend, it varies in kind very much in the different forms, and also in different cases where the local disease is of similar character. Boils are most common in young and what are called healthy subjects; the more obvious condition being that of repletion. They are most frequently seen in those who feed heartily, without taking the requisite quantity of exercise, and who are rather inclined to that fatness and roundness of form which, when

more developed, constitute general obesity. Boils may occur singly, or there may be two or more, or several in succession. I have seen a few cases where a great many appeared at the same time, in various degrees of progress; but such cases are not *very* common, except now and then, as the sequelæ of blisters in patients whose skins are unusually susceptible of irritation. Boils are not, however, peculiar to the class of persons I have first mentioned. Individuals of a bilious temperament are often very subject to them; and, in fact, they occur more or less frequently with almost every variety of disordered condition of the general health.

Carbuncles, in forms more or less severe, are always connected with deranged conditions of the œconomy, and, in many cases, of a serious nature; sometimes implying organic disease of the viscera, but of the liver more commonly perhaps than any other. They usually occur in adult, or still more frequently in advancing, life, and in persons who have either lived on too full a diet, or who have been hard drinkers. They are not however necessarily, I think, connected with such modes of living; any mode, involving habits of any kind which tend to impair the functions of the body, such as bad air, unwholesome food, or deficient exercise, seems competent to their production. I have seen them in all sorts of people; but I think scarcely ever in the severer forms, except in those whose former habits had involved excess in some way or other as to eating and drinking, habits which are known to impair the functions of the chylopoietic viscera, the liver perhaps more especially, and to disturb the functions of the nervous system. Boils and carbuncles are also not very unfrequent occurrences as the sequelæ of febrile excitement; and it would seem that carbuncles are very usual concomitants of the plague.

All these diseases have this character in common: disorder of the general health, and, locally regarded, great excitement, with indications of measured power. In all, the inflammation is severe in all its characters; in all, its products are not those of healthy inflammation; and, in all, we observe more or less sloughing; this being, in boil, an invariable accompaniment; in carbuncle, the leading feature. In carbuncle, it is interesting to observe the thickening and consolidation of structure; which, though imperfectly developed, seems a type of that adhesive process which tends to restrict the progress of inflammation to the district required by the exigencies of the animal œconomy; and, as I have already observed, these diseases are very emphatic illustrations of that view

of inflammation (not induced by the necessity of repairing local injury)which regards it as a process by which injurious agents or conditions of the œconomy are got rid of by actions determined to the surface of the body. The

TREATMENT

of these diseases is similar in principle, though requiring certain modifications in its details. In boil, a restricted diet, the avoidance of wine and fermented liquors, an efficient aperient, and subsequent regulation of the bowels, with a poultice to the part, are all that are necessary. In most cases, thus treated, the boil may be left to open itself; but now and then it may be necessary to open it, when the opening should be a moderately free one, to allow of the ready discharge of the thick matter, and the bit of cellular tissue which is usually contained in it. Although this be all that is generally necessary, patients should be warned against trifling with these complaints; as in some cases, when thus disregarded, the inflammation may become very severe, disturb the constitution very much, or take on even a phlegmonoid erysipelatous character. I knew a gentleman who, having an ordinary boil, thought it necessary so far to pursue his usual habits as to drink a certain number of glasses of port wine daily, and make no alteration as to the quantity of his diet: under these circumstances, extensive inflammation of an erysipelatous character took place; the case was severe and tedious; and left a large sore, which was slow and difficult to heal, and requiring much greater privations than any of those to which he had at first objected.

In ordinary cases, however, there is just sufficient constitutional disturbance to ensure the required attention. The pain makes rest and poultice either essential or agreeable; the stomach requires little food, the appetite being absent or very deficient. I should observe to you, that, if a bad boil occurs under circumstances rendering rest inconvenient or impracticable, as sometimes happens in travelling, a little pressure, by means of a bandage, very much relieves the pain during the time that the patient is obliged to be in motion.

If a patient have many boils, the abstraction of ten or twelve ounces of blood will often produce a rapid improvement in his condition; and this is so well known that I believe the remedy is not of very unfrequent adoption. It is, however, always unnecessary,

if the patient be moderately attentive to the rules prescribed; and, although at one time I used in rare cases and plethoric habits to adopt this mode of proceeding, I have long since relinquished it, as wholly unnecessary. In regard to carbuncle in slight cases, with the exceptions presently to be mentioned, the treatment will be the same as in boil; but, in severer forms of the disease, we should be a little more active. We generally find the alimentary secretions very much disordered; and those of the liver seldom right. An active dose or two of calomel and antimony is here usually necessary, the bowels having been previously well cleared in the manner already recommended in the treatment of inflammation. After this, a very gentle saline aperient, with or without a minute dose of tartrate of antimony, may be given every four, six, or eight hours, according to the case; and the diet should be gruel and toasted bread, and this in moderate quantities; or, if appetite be deficient, gruel only. This plan should be gradually relinquished as the secretions improve, and as the sloughing becomes established. The medicine may then be advantageously restricted to a Plummer's pill every other night, and an aperient or an injection in the morning; but, if the bowels be already regular, and the secretions moderately healthy, neither of these measures are necessary. At this period, beef-tea, good broth without fat, and a moderate quantity of bread, should be allowed; and this gradually increased to a more nourishing diet, including a boiled mutton chop daily, until the patient is recovered. In some cases, where people have been much accustomed to full living, you will find, at the latter period, a little porter, or even small quantities of wine, occasionally useful; but, in my experience, they are not often necessary: and the same observation applies to bark.

Where the stomach is slow in resuming its wonted appetite, there is generally a good reason for it. Nevertheless, in some cases, the decoction or infusion of bark, with ten or fifteen drops of the dilute nitric or sulphuric acid, seems to accelerate the patient's recovery, without being productive of any disadvantage. Nay, sometimes the bowels, which may have required aperients before, now act of themselves apparently as the result of an improving condition, which the bark seems to accelerate. As I have before hinted, however, the best strengthener is a plain, moderate, and nutritious diet, adjusted to retiring excitability, the state of the secretions, and other characters of the individual case.

The local treatment of carbuncle is very simple. It is of no

use to try leeching here; you seldom do any good; you always protract the cure. Nature is trying to bring matters to the surface: you should assist her in so doing. I do not say this, if you were consulted in regard to a carbuncle at the very earliest period of its occurrence; you would then only see a patch of red, limited in extent; and, in fact, not yet arrived at that stage when the characteristic features of the disease are developed. If you catch it at this time, check the local excitement by leeches, and endeavour to correct the disordered functions which may accompany the case: you may remove the cause of the disease, and prevent its further progress. We do not, however, usually see things at this period; but when the inflammation is so far developed that sloughing is unavoidable—in this state leeches are of no use. You should make a free incision with a sharp knife through the brawny integument covering the disease. The cellular tissue and skin are here so much consolidated, that nothing short of a thorough division, carried quite through the whole skin covering the affected surface and cellular tissue, will answer your purpose (in which carbuncle differs from erysipelas): and, should the disease be extensive, you may not find one sufficient, but be obliged to make two or even more.

Ordinarily, however, one incision across the *whole* disease, and of the required depth, will answer the purpose. I think the linseed-meal poultice should now be applied, as there are usually no actions which it is necessary to repress; and the pain ordinarily subsides. It is necessary to observe that you will sometimes be called to a patient, *for the first time*, when the carbuncle has been allowed to pursue its own course without any assistance from treatment, either locally or constitutionally. Under these circumstances, you will find a large surface exposed by sloughing, presenting a strange party-coloured cavity, surrounded by thickened and indurated integument, in a state of greater or less inflammation; the patient's powers very much enfeebled, and in a condition threatening their extinction; so that you have, in fact, nothing to do but support strength, for which, nutritious diet, porter, or wine, may be necessary.

In such a case, give as little medicine as possible, and regulate the bowels by injections or very mild aperients, as manna or castor oil. Should the bowels be purged, warm, aromatic cordials, with a little hydr. c. cretâ, will be a proper medicine; or it may possibly be necessary to employ such remedies as the chalk mixture, with or without the addition of some narcotic: but you had better re-

mit these measures, and especially opiates of any kind, so soon as the symptoms which indicated their necessity have subsided. I have no experience myself of carbuncle occurring as a consequence of fever. The treatment of the carbuncle would be the same, no doubt; and the fact is chiefly interesting, as marking alike the connection of the disease with constitutional disturbance, and as emphatically illustrating the general law under which all inflammations (not instituted for the repair of local injury) occur.

In carbuncle, generally, the plan which I have mentioned is that which I have uniformly seen successful. The only modification of it refers to the comparative conditions of different patients, as evidencing greater or less power. I should advise you to pay attention to the strength, and either increase the food or continue the more sparing diet, as you find debility or excitability take the lead, as it were, in the case; the treatment of which should be a well-adjusted mean between excitement and depression: and, as in all other inflammations, you will find great benefit from that addition to the general measures for the correction of disordered function which the detection of the more particular disturbance of any organ will suggest to you; but of this I have already sufficiently dwelt, in the general treatment of inflammation. Of bleeding, I have not spoken. Most writers mention it as a remedy which may be useful in some cases. I can only say I never saw a case in which I should think of prescribing it; nor can I conceive it to be otherwise than injurious, except when a patient obstinately refuses to observe the cautions prescribed to him.

I give the two following cases; the one as illustrating the common treatment of the disease, and the other as exemplifying those extensions of the stimulating plan which are occasionally necessary. I shall, however, merely give the more essential points, the details being tedious and unnecessary.

I was requested to see a man of fifty-two years of age, who had something the matter with his neck, and who was described as being in the most indescribable agony. When I saw him, I found that he was a butcher by trade; that he had been a hard drinker; but he said that, for the last thirteen years, he had been a temperate man. I observed the whole of the back of the neck, and the inferior boundary of the scalp, occupied by the most malignant-looking carbuncle I had ever seen. The colour was deep-red, approaching a leaden sort of tint; large venous trunks were seen ramifying in different parts; the swelling was very extensive; and

the skin felt hard and brawny, with the exception of one portion, in which, through a few sloughy apertures, there issued a sort of unhealthy sanies, of a most horrible fœtor, which excoriated the parts over which it flowed. The pain was excessive, and so intolerable in a recumbent position, that the poor fellow had scarcely laid down, night or day, for three days in succession. He said it had begun in two small pimples close to each other, which had gradually coalesced; and that, from this time, his sufferings, which had been getting worse and worse, had become intolerable. He appeared exceedingly depressed in power, although greatly excited; pulse quick, frequent, and small, but rather hard; tongue white, and much coated; thirst; alvine secretions greenish. I made three long incisions through different parts of the surface thus extensively affected; and I ordered a poultice, with some vinegar in it, with a view to correct the insupportable fœtor of the discharge, which was afterwards changed for the chloride of lime. He also had his bowels well cleared by graduated doses of calomel and jalap; and he took a drachm of the tincture of hops, with the same quantity of liq. antimonii tart. in infusion of calumba, at bedtime.—July 24th. I found him a little better. The pain was considerably mitigated, and he had had some refreshing sleep, although but for short periods at a time. No appetite; pulse much the same; bowels are opened, and the excretions improved in appearance. To take decoction of bark, with ten drops of dilute sulphuric acid with each dose—25th. Stools as before; a good deal of pain at the back of the head, where the inflammation is very livid and skin very hard. I now extended the three incisions I had already made up the occiput; and, as his bowels still evinced depraved biliary secretion, I ordered him to take, at night, five grains of calomel, with fifteen grains of jalap. This produced fresh discharges of the same kind of disordered secretions, followed by stools of a natural colour; pain relieved; he now slept tolerably well; but his pulse was small and rapid, and his countenance expressive of great anxiety. Sloughing progressing fast; and discharge of fœtid and unhealthy matter considerable.—29th. He is rather better; and some healthy pus is mixed with the discharge from the carbuncle. He is, however, very weak. Ordered to increase the quantity of porter which he began to take on the 26th; to omit the sulphuric acid; and to take ten grains of the subcarbonate of ammonia with each dose of his bark. His secretions natural, and his tongue much cleaner. He now went on very favourably

until the 5th of August, when he unfortunately, stumbling over something in his room, had a severe fall, which shook him very much. He had continued his bark and ammonia, and was taking three glasses of port wine and a pint of porter daily. The neck at this time presented a horrid appearance; for, as a consequence of a very deep and wide slough extending across the whole neck, and the surrounding swelling, it looked as if the head was half severed from the body. The fall threw him back considerably; the pulse sunk; the separation of the sloughs appeared to be ceasing; and he complains of faintness "coming over him" at intervals, with occasional sensations of constriction across his throat and chest. He, however, completely rallied from this, and his treatment was continued until the sloughs had been nearly thrown off, shewing granulating surfaces occupying the situations of those sloughs which had separated; his tongue had become clean; bowels regular; secretions good; he was allowed a diet of mutton, wine, and porter. Seeing that we could not afford the smallest mistake, I had cautioned him, in the most earnest manner, to take nothing but what was allowed him; and, knowing the habits of these people in London, I had specially warned him against eels and oysters, which, without such special interdiction, they are almost certain to indulge in. I found him one morning, however, not so well; his pulse was weaker and more rapid; and he complained of diarrhœa. I now found that he had eaten a quantity of oysters the previous evening; and, although we tried everything we could think of, and hoped at one period that we had succeeded in arresting the diarrhœa,—yet, after a few hours, it recurred, and sunk him.

I may observe that the weather was excessively hot, and I never saw so bad a case, either as regarded the severity and extent of the inflammation and sloughing, or the complete prostration of strength and disordered function by which it was accompanied. But a great many gentlemen saw the case; and I believe no one had the least doubt at the time, immediately preceding the attack of diarrhœa, but that he would recover, or that the imprudence he committed was the cause of the diarrhœa which sunk him. I may observe here also, that, notwithstanding that we could think of little else but supporting his constantly flagging powers from the commencement, yet nothing seemed to produce so much permanent benefit as the effect on his secretions by the calomel, which the indication of hepatic disorder suggested, and which his great debility had induced me to endeavour to correct by milder measures. This

is, to the best of my recollection, the only fatal case of carbuncle I ever attended; but I mention it because I think it instructive.

AN ORDINARY CASE OF CARBUNCLE.

Jane Ring, æt. about forty, applied at the Dispensary with a carbuncle on the posterior surface of the body at the lower part of the back. The inflammation occupied a space about the size of the palm of the hand. She has had the complaint about a week; and a number of minute ulcerated apertures had already taken place, presenting a sort of sieve-like appearance, to the extent of about half-a-crown, in the centre of the inflammation. She has been in good circumstances, but of late has been somewhat distressed; but, prior to this period, has always "lived well."

Her bowels are costive, and they are habitually so; the colour of her evacuations, she says, are like "light brandy;" tongue much furred; urine somewhat scanty and high-coloured; perspiration copious; appetite deficient: has always had, before, a hearty appetite. States that she never drinks spirits or beer. Catamenia regular up to last April,—it being now August. She says she has always had good health, with the exception of costive bowels.

She was ordered a powder of jalap, containing one grain of calomel, to be taken every three hours, until her bowels are thoroughly opened. Two free incisions are made across the carbuncle. She is ordered a moderately nourishing diet; but not to eat animal food for the present. When her bowels were freely opened, she was directed to take a wine-glass full of a mixture composed of a weak solution of salts with tincture of lavender, in mint water, twice a day, to keep them regular. A large linseed-meal poultice is applied to the carbuncle. Three days after her admission, the mixture to be taken only at night. No alteration or addition was made to this treatment: the sloughs separated, and the part gradually proceeded to heal, without any other measures than a gradual return to her ordinary diet.

I have selected this case, as it occurred in a woman; carbuncles being, in my experience, much more common in men.

The treatment of carbuncle then is, you see, but the treatment of common inflammation, where the disordered function and the deficient power are well marked. You evacuate the bowels; you

solicit a moderate and healthy condition of the secretions; and you direct your attention specially to any one organ that may appear particularly at fault; you assist Nature in her endeavours to bring matters to the surface by free incisions; and you support your patient by a light and nutritious diet, in proportion to the nature and exigencies of the case; you keep a vigilant eye on the powers of the œconomy, and add stimuli if their declension, either actual or threatened, renders it necessary.

I shall devote the rest of this Discourse to, and conclude this volume by, a few observations on

BURNS AND SCALDS.

When you consider the important functions of the skin, the extent, variety, and quickness of its sympathies, you at once perceive that it is an important organ, and one in which a sudden or violent injury would be very likely to disturb the whole œconomy in a serious manner; because you know of no organ in which this ever happens without much serious disturbance. Such simple considerations would at once lead you to the perception of the general character of burns; they would lead you to expect that, in severe forms, they would be highly dangerous. But as you have seen that Nature, in carrying out the law of inflammation, places the majority of these processes on the surface; and, as you perceive that inflammations at or near the surface are those which practically prove least dangerous to the animal œconomy; so you would expect that the infliction of burns, *quoad* the amount of injury, would be less dangerous than similar injury or inflammation elsewhere. This is really the case; for, dangerous as severe burns are, on account of the extent and importance of the surface affected, yet we know of no organ, except the skin and cellular tissue, on which the same amount of injury, as that of which we witness the repair in burns, could be inflicted with the smallest chance of recovery.

Indeed, these accidents, and the consequences to which they lead, become invested with additional interest when we arrive at the perception of true views of inflammation. Accident here furnishes us with a series of experiments, of which any institution by art is impracticable. We see the resources of the œconomy

suddenly put in requisition under a great variety of circumstances, where the shock given, and the forces required to sustain it, or repair the mischief it has occasioned, occur in every conceivable degree: and where, in addition to all other variations we have that resulting from the injury affecting different districts of the surface. Accordingly, burns and scalds are exceedingly interesting, because very instructive; they shew the harmony and simplicity of the operations of Nature; and also that, whatever artificial distinctions we may establish between various kinds of injury, the law under which they are repaired is the same in all; and that the execution of or interference with that law depends on the same conditions,—that is, on the healthy condition of the animal œconomy on the one hand, or on certain disturbances of it on the other; which may either have existed previous to the infliction of the injury, or which may have been created as the immediate consequence of such infliction.

Now, most writers on the subject of burns seem to have regarded, and very properly, the inflammation as the chief circumstance to be kept in view in the treatment; but still the practice which they have superposed on such views has generally indicated that their notions were not very clear, and that they were mixed up with an impression that these accidents had something peculiar about them, either resulting from the agent (heat) which produced them, or from other circumstances. Hence, in addition to the treatment laid down by the writer—if, indeed, it be not included therein,—we find a variety of different remedies mentioned, on the authority of others, of *apparently* the most opposite nature. Thus, cold water, heat, preparations of lead, alkaline remedies, soap, various ointments, spirituous and stimulating applications, are a few examples from the heterogeneous catalogue with which we are usually presented. They seldom seem to have been sufficiently impressed with the fact, that the real remedy was, after all, the usual process of Nature in repairing injury; and that what little assistance art afforded was referrible to one or two simple principles which would at once explain the matter. Dr. Kentish, however, is an exception to this view of the subject, and seems to have been the first writer who, in a practical sense, instituted a more rational treatment for severe burns; although, if I understand him correctly, he does not state the true principle on which the treatment is founded; making it, in fact, peculiar in its relation to burns, whilst it proceeds on a principle common to other injuries.

In the first place, you must dismiss from your minds any thing connected with any *peculiar* property in heat, and look at a burn in regard to its essential characters, which are these:—first, a violent and *sudden* injury inflicted on a very important organ; and, in some cases, requiring very extensive repair. If you restrict your views, in the *first place*, to these essential facts, you will soon arrive at the comprehension of the symptoms of burns, and be led to their appropriate treatment. As in all other injuries, the effects will of course be modified by the degree of injury; some being so slight as to require no treatment at all; others, again, suggesting more or less assistance from art, with a view, however, chiefly of relieving suffering; whilst, in a third class, where the injury is severe, a patient's life may depend on your affording what little assistance may be in your power promptly and judiciously, or in avoiding interferences which are injurious.

All kinds of injuries produce all kinds of effects; in which, however, we recognize one property in common—viz. actions having more or less *tendency* to repair them:—first, according to the degree of the injury inflicted; and, secondly, according to the state of the body subjected to it. You have seen already that slight scratches will sometimes produce very injurious consequences, even death itself: you know that, *generally*, such injuries are of no consequence. On the other hand, very serious and extensive injuries, which may at once destroy certain portions of the body, may be repaired by the powers of the œconomy. Therefore, in all cases whatever of injuries ordinarily termed mechanical, or whether we extend the notion to those which act, as we say, chemically—as fire, mineral acids,—or whether we include those innumerable and intangible influences which result from atmospheric agencies, there is this one essential thing to be considered in regard to all of them —viz. that an injury to the body, of whatever kind, which does not at once destroy it, must, in a practical sense, be regarded as compounded of two forces, very different in their nature perhaps, but common as modifying the effect of such injury. These forces are, the injury as characterized by its violence or intensity, and the condition of the body as tending to increase or diminish the prejudicial consequences of such injury. You will never understand the phenomena of what are called mechanical or chemical injuries, unless you thus couple them with the more enlarged view of injurious influences generally which I have endeavoured to explain.

Now, in burns, and I talk of severe burns, you see a very

sudden and extensive injury to one of the most important organs in the body; and therefore you will not be surprised that they should often prove fatal, because this is very commonly the result of *all* severe injuries to *all* important organs. Neither will you be surprised, if you carry with you the preceding views, that, in regard to these accidents, the recovery of the patient will not always have a *necessary* relation to the extent of the injury; in other words, if you see the same extent of injury fatal in one case, and not so in another; and further, if you observe one patient sink under a burn much less extensive than some whom you may have seen to recover. To illustrate that view of burns which regards their essential character, as a violent injury to an important part, let us see how nearly we can deduce the essential points, in connection with these accidents, from others affecting other parts, and where the agency of heat is out of the question: and for this purpose it matters little what part we select; because, although the details may be different, the nature of the case will be the same. We will suppose that a man has a violent shake of his brain, by a fall or some other injury (concussion, as we call it). What happens?—why he is probably sick, his pulse is very low, his extremities cold; this lasts for a certain time, and then warmth returns, the pulse resumes its power, and sensation is restored. We now generally find that a contrary state supervenes,—there is excitement; and we fear that, if this be not subdued, inflammation will follow; and as inflammation in the brain is a thing highly dangerous, we endeavour at all hazards to prevent its occurrence.

If we have a wound of the chest or abdomen, similar results occur; that is, we have coldness and depression, disordered function, not disordered consciousness, perhaps, as in the brain (because the functions of the parts are different), but sickness, or impeded respiration; then we have returning power, with threatening of undue inflammation. But, since the latter is necessary in wounds, we do not take it for granted that it must necessarily be dangerous; and therefore we do not set to work as if we had determined that formidable inflammation *must* occur; but we watch the degree of excitement, and act accordingly. If *such* inflammation threaten, we immediately, as in the case of the brain, endeavour to subdue it at all hazards, and for the same reason—viz. the great danger attending it.

Now, then, let us take a mechanical injury on the surface of the body. A large district of skin is killed by a blow, or it is stripped off by a piece of machinery. Here again we have sick-

ness, coldness, a state of depression; an injury has been sustained of an extent that would destroy life, were it inflicted on the brain, lungs, or many other parts. We find here, again, the same set of phenomena; and, after a time, the same reaction taking place: but instead of setting violently to work to subdue this reaction, many considerations withhold us from such a proceeding. In the first place, we perceive an extent of injury requiring repair, which we know demands considerable power. We know that this repair cannot take place without increased action; in fact, without inflammation: and further, we know that inflammation of the skin is by no means so dangerous as it is in the lungs or brain, or many other parts; unless, indeed, very large districts of skin be affected at the same time: and if this be the case after an injury involving destruction of a large surface, we find the system so depressed, that we have *seldom* much to fear from any exuberance of inflammation; and we are further assured that the repair required will be risked by any reduction of power. We therefore *commence* the treatment of all the cases which I have mentioned exactly in the same manner, or at least on the same principle; that is, we put the patient to bed, and either give him a light cordial or not, according to the severity of the case and the depressed condition of the system. If the organ injured be one in which we especially fear the presence of inflammation—the brain, for example,—we withhold the cordial if possible.

In the case of external injury to the skin by crushing or laceration, we place the part in a position which may best protect it from motion, friction of bed clothes, or other annoyance; and we place over it some application or other that is of mild, warm temperature, and which defends it from exposure to the atmosphere: the best is a common well-made bread-and-water poultice. This we medicate with poppy or other things, according as the pain or other symptoms seem to suggest. As the powers return, we aim at the prevention of excitement at first by a very mild, rather spare diet; and as we perceive the excitement approaches only that degree which always accompanies repair of severe injuries, we improve the diet, with a view to support the patient's strength, so far as we can, consistently with the avoidance of increased excitement. Now here, with the exception of some modifications in detail, I have been describing the principle on which the treatment of burns should be conducted; and yet you see I have not spoken of heat as having any thing to do with these accidents. I shall

hereafter speak of other conditions of the œconomy, where the excitement is continued, and where the injurious influences are of a different kind; and I shall then shew you the harmony of the operations of the œconomy in respect to all injuries whatever.

As to heat, we know not what the matter of heat is; but we know a great number of the effects it produces; and that these effects are very different, according as it acts on animate or inanimate bodies. In the latter, it separates the particles composing them to greater distance (expansion); in the former, it excites the living actions. Inanimate substances are affected by every variety of heat, their temperature being greater or less, as the heat is increased or diminished. But animals have the extraordinary power of preserving a degree of uniformity of temperature independently of that of the surrounding atmosphere. The range of this power is very different in different creatures, and it is limited in all. In all living bodies, however, heat excites the actions of life; in vegetables as well as animals. They all live faster under a high temperature; and if this be very great, the excitement very soon destroys vital power, and both vegetables and animals die. We see the same effect of heat applied to a part; in one degree it excites gently, and produces phenomena which are attended with comfort and increase of power; in another, it excites so as to produce weakness; in a third, it produces the excitement of inflammation, and this may be so great as to destroy the living power of the part and produce sloughing; and again, the heat may be so violent as to produce the same effect on animate as on inanimate substances,—that is, at once to decompose the part: all of which results we observe, not only in regard to burns, but also in other kinds of injury, where no heat has been applied.

Apart from that case in which heat immediately destroys a part, *blisters* and *burns* often produce exactly the same phenomena, according to the case,—either redness, which subsides, or which proceeds to vesication, or ulceration, or mortification. Heat, therefore, abstractedly considered, is to be regarded as any other injurious agent, in that it excites the actions of the part, or destroys its vitality, according to the intensity of its action: the processes to which it leads being, in a general sense, those calculated to repair the mischief it has occasioned, but subject to modifications according to the condition of the body to which the injury is applied; as I have before stated. Thus you may have extension of inflammation of erysipelatous character beyond the parts injured. In some cases this condition will modify these processes so as to

give them a character very distinct from any usually observed to result from burns. I saw a man the other day who had spilt some boiling lead over his hand a few days before: the district affected was very trivial, and the slough nearly separated; but the man had pain up the inside of his arm, and inflammation in the absorbent glands of his axilla. I knew perfectly well that there must be some condition here by which the effects of the burn were thus modified: on enquiry, I found that his bowels were costive; that he had considerable tenderness over the liver; that his tongue was furred; his pulse frequent (110); and found also that he was a typefounder, and that he said he was much exposed to the fumes of lead. Here you see the disordering agency was almost wholly due to the condition of body on which the burn had been inflicted, and the remedies of course entirely directed to that condition. The man was, in fact, just in that condition in which many, and indeed most people are, who suffer from wounds received in dissection, or from inflamed absorbents from any other cause. This man speedily recovered by a few doses of calomel and antimony, a few leeches, and the prompt discharge of suppuration in the axilla, by an opening made for that purpose.

Being now sufficiently aware that you are to discard any idea of heat producing any peculiar effect, *as heat*, in these accidents; and that you are merely to regard it, in common with other injurious influences, as stimulating or destructive, according to circumstances (not forgetting that these include the condition of the body in which the injury is inflicted); you will at once perceive what must necessarily be the local and general symptoms of burns, according as the injury is trivial, severe, or destructive; and these we will now consider.

You know, if you take hold of a hot body, as a handle of a tea-kettle for example, that, admonished by pain, you get rid of it as quickly as possible; and that the results are an acute pain and redness of the part, which, after half an hour or so, will subside. That, if the part be subjected to the heat of boiling water, it will, according to circumstances, either produce extensive redness and pain for a longer period, or it will blister the part; and that this may speedily get well, and the cuticle so blistered be thrown off; or it may be followed by ulceration of the surface, or even superficial mortification. That, if the heat applied be greater, such as that of melted metal, sloughing is almost certain to follow; and, if this heat be increased in temperature, or be applied for a longer period, the surface of the body is at once charred and decomposed,

becoming black; and that all this must be separated by sloughing before the repair can take place by granulation in the usual manner.

We will now, then, consider the symptoms of burns where the heat applied is great, the surface extensive. In such cases, the patient complains of great pain and heat in the parts affected by the accident; but, in almost all cases, there is also a *general* sense of cold. This varies in different cases: in some, there being general chilliness; though, for the most part, absolute and severe shivering; in many examples, as severe as that which characterizes the first stages of ague. You see here the immediate depressing effect of severe injury on the skin; and that the shivering is more marked than we perceive it to be on injuries of other organs. This state is succeeded by excitement, the pulse becoming accelerated from 100 to 130; thirst; restlessness; and, in short, the ordinary phenomena of fever. The bowels appear generally to require some solicitation, the tendency appearing to be to costiveness. I seldom find that this is mentioned as a *characteristic* symptom. If the patients die, they may sink under the immediate shock of the severe injury; they may go on for three or four days until suppuration becomes established, or they may die about the eighth or ninth day, during the earlier stages of the separation of the sloughs. This is the experience of Dr. Kentish; and it accords with my own, although I have not seen a great number of these accidents, considering that I have not been unfavourably circumstanced. After a time the excitement subsides, except that degree which we almost always observe in the repair of injury, and which is chiefly characterized by a sustained frequency of pulse, somewhat more than natural. If the patient die, the excitement is followed by embarrassed respiration, torpor, perhaps delirium, and he dies comatose. I should have mentioned that some affection of the urinary secretion is usually observed in burns.

Dr. Kentish has given very good instructions as to the treatment of these accidents; and which, in a practical sense, seem to proceed on correct principles. I think, however, Dr. Kentish, in a very natural disgust with the former treatment of burns, which proceeded on no principle at all, or on one evidently false, seems rather to have fallen into an opposite error; and, in combating that practice which would at once employ sedative applications, appears to continue those of a stimulating kind rather longer than there is any occasion for them. Neither do I think that the analogy that Dr. Kentish draws, between burnt and frost-bitten parts, is quite

the right view of the case; so far as relates to the gradual bringing back of parts to their natural condition. A great deal of the obscurity and difference of opinion on the subject of burns evidently results from too much having been attributed to art and too little to nature; for, as Nature is the chief agent in all, so it necessarily has happened that burns of the same description have done well under very different and opposite modes of treatment. The body suffers a severe injury: the main question is, whether its powers are equal to sustain or repair it? If they be equal, the probability is, that none of the applications, usually employed in burns, will render them otherwise: if they be unequal, it is equally probable that all measures will fail in rendering them otherwise.

In very severe injuries, however, it is reasonable to suppose that a very little interference may in the one case throw the balance in favor of the injury, and in another in favor of the constitution; and therefore the treatment of burns really, in a practical sense, becomes interesting only as regards the severer cases; since, in trivial forms, the constant recovery from these accidents, under all sorts of treatment, strongly leads to the conclusion that neither of them exerted any very potential influence as to the ultimate result of the case. For, whilst this conclusion is perfectly reconcileable with what we know of the powers of Nature, it is equally so with the facts presented to us in that variety of local treatment which we perceive to have been adopted by different writers. In such cases (I mean light cases) the only thing appears to be to remove impediments in the way of Nature; and we find this best accomplished by general repose and the correction of any disorder of function; because we know that disordered function weakens the powers of the general œconomy. Another point in light cases (as well as in severe burns) consists in diminishing the sufferings of the patient; for we may thus facilitate and accelerate that favorable termination which we do not abstractedly control. In *severe burns*, however, experience proves that the calls on the powers of the œconomy are in most cases very nearly equal, in some superior, to those powers: and, as we can never determine before hand which of the two it is to be, so it becomes a very important consideration what we are to do; because, where the power and the agenda are in pretty equal counterpoise, it follows that a very little increase of the one, or interference with the other, will render the case unsuccessful. In investigating this question, I confess that there appears to me only one mode by which we can aus-

piciously seek the information we require: and that is, by regarding those circumstances which apply to all severe injuries in common, where the injury requires repair; because, as the laws of Nature are simple, we shall most probably arrive thereby at the real interpretation of her wants; and thus be led to the simplest mode of assisting in their supply. In all cases of severe injuries, we perceive that the system receives a shock, which is accompanied or characterized by depression of power. In all cases, we perceive this depression followed by excitement. If the body be in good order, this excitement is moderate; if otherwise, it is apt to be excessive. If excessive, we naturally endeavour to moderate it; and the true mode of doing this is the same in all cases: that is, by removing the cause of this excess. Now this we find (in conformity with the laws and phenomena of inflammation) to be either a general absence of natural power, from some inscrutable condition of the nervous system; which may either result from the severity of the injury, from causes unknown, or from some condition of some of the organs of the body: the former we cannot recall; the second we are ignorant of; the third we may or may not be able to discover. Hence, in all cases, when quiet, warmth, and, if necessary, stimuli, shall have been followed by recovery from the immediate depression of severe injury, we next moderate the excessive excitement. In some cases, as in the brain, lungs, &c. where the injury, as regards the repair required, is trivial, we endeavour to arrest it by any means we can: and here we may employ many with impunity at least,—which we cannot do where the case involves that sustained increase of action necessary to repair. In these cases, we are exceedingly anxious to avoid anything that tends to decrease power; because we know that power is necessary: therefore, such a measure as bleeding, in burns, is highly doubtful, as probably prejudicial; and therefore we should refrain from bleeding on the occurrence of excitement, for the same reason that we should in the case of a compound fracture. You know that this remedy has been occasionally employed in both; but I hardly conceive that it can ever be proper. Of compound fracture, however, I cannot now speak; and, in burns, bleeding is now scarcely ever, I believe, employed. The proper mode of allaying undue excitement is by ministering to those conditions of the body which favor its excess: this will practically include a general attention to the various organs, with an especial reference to any which may appear particularly disturbed; the evacuation and regulation

of the bowels, and the ensuring a regularity of the biliary and digestive functions; and, in burns, the state of the kidney should also receive our particular attention. Then, as regards the parts injured, why you place them in the most comfortable position you can, you apply comfortable *warmth;* you defend the parts from the contact of air; the warmth during the stage of depression being of all things most desirable. When the excitement begins, you make no alteration, except that, if your measures in relieving the depression involved any stimulating agent, common sense suggests its abandonment. We then address ourselves to the excitement, by the measures already mentioned; and, this having been reduced, we then support the patient's powers by plain and nutritious diet, carried so far as we can do it without inducing excitement; and, as patients are generally weakened by the joint effect of the injury and the excitement following it, and as they are now taking, of course, no exercise, we find, practically, that this diet is of a measured kind, implying a sustained moderation as to quantity; that this varies in different cases, seldom amounting to the full diet of health.

I have thus endeavoured to shew you that the treatment of all serious injuries is, in principle, the same; and thus to impress, that burns, therefore, are to be treated on one common to other injuries: and I think you will perceive that, with some little modification, it is in harmony with that treatment which Dr. Kentish recommends, who has written, as it appears to me, far more scientifically on this subject than any other author with whose writings I am acquainted.

The only difference is, that Dr. Kentish extends the stimulating plan beyond that period at which the patient recovers from depression, and apparently with a good practical result, though not, I think, on a correct principle. Dr. Kentish thought that the treatment of burns should be, as I have observed, conducted on the same principle as frost-bitten parts; and as, when a part is frozen, the practice is to restore its equilibrium by the *gradual* application of snow, cold water, &c. until it was at length subjected to the ordinary temperature, so Dr. Kentish begins by stimulating strongly; then he reduces his stimuli; and at length relinquishes them altogether, the stimulus being then only that of a moderately light and nutritious diet. Now, in the first step, Dr. Kentish arrives by a different route, as it were, at the plan employed on the immediate infliction of any severe injury on a vital organ, increas-

ing the stimulation in a way which we dare not do when the lungs or brain, for example, are affected; and for a good reason; because, in the lungs and brain, we are afraid of any subsequent inflammation: whereas, in burns, we cannot do without considerable and sustained increase of action, since the repair depends on it. Then, in the second stage, instead of withdrawing his stimuli, as the excitement occurs, at once, he does this gradually; whilst, for the reasons already mentioned, when vital organs are affected, we withhold them at once. The third stage, though it implies (*quoad* Dr. Kentish's previous stimulating measure) a reduced diet, is practically much the same as that employed, at the same period, in any other severe injury which demands extensive repair, as in compound fracture.

Indeed, as compound fracture is much more analogous to a burn, than injury or concussion of vital organs is, in the extent of repair required; so is the treatment much more closely allied to Dr. Kentish's treatment of burns, in that chary reduction of power which characterizes the management of such cases, when compared with our treatment of injuries to organs, where, whilst inflammation is more dangerous, the accident seldom implies the necessity of any material repair of structure.

In burns, therefore, the treatment is, in principle, essentially the same as in all severe injuries, the characteristic feature being a most careful husbanding of the powers of the œconomy, rousing them until excitement be produced; and then gradually withdrawing all adventitious stimuli, except those which give substantial power, as nutritious food, and medicines which either confer power by regulating the various functions, or which seem to have this property by sustaining the powers of the stomach without exciting the system, in the way that bark appears to do. Before I speak of the general treatment of burns, I may observe that Dr. Kentish found it necessary to give calomel in certain cases; and that he regulated the bowels by aperients and injections. He says that the case was often accelerated, during the healing process, by occasional purgatives. He also employs tonics of bark occasionally, changing these for medicines of the same class.

Supposing, then, a severe burn to have been inflicted, the knowledge of the *principles* on which you should proceed, as distinguished from an acquaintance with a catalogue of various and opposite remedies, will at once furnish you with the plan of treatment under almost any circumstances; and this, of course, is a

very material thing in all cases of accidents, which occur in situations and under circumstances in which you may or may not have particular applications at hand. In the first place, you remove all clothes or covering from the burnt surface, which should be done carefully, and with as much gentleness as possible; you then (I am only speaking of severe cases) put your patient in bed. You can always procure alcohol in some form or other, as common gin, or some other spirit; and with this, previously warmed, you can gently sponge the burnt parts. If you have it at hand, you can then lay over them light dressings of lint or linen, thinly spread with yellow basilicon; this will be a gentle stimulus to the parts, and will prevent the dressings sticking, when you wish to renew them, or replace them by some application which you may prefer, and which, in the interval, you may have been able to obtain. If your patient be very depressed, you may give him a light cordial, such as the aromatic confection, with cinnamon-water, and a drachm or two of spirit in it; or, should this not be at hand, a little spirit and water may be substituted, in equal parts, and given warm. If the pain be very severe, thirty or forty drops of laudanum may be added with advantage. Dr. Kentish first bathes the burnt parts with spirit of wine and camphor, and then lays over them dressings spread with yellow basilicon, rubbed down with sufficient spirit of turpentine to render the ointment thus formed of the consistence of a liniment, which he applied warm. I should advise you to apply this dressing if you can procure it, in preference to any other, for many reasons: first, because, as a first dressing, it is evidently in harmony with the principle on which that depression immediately consequent on severe injuries should be treated; secondly, because Dr. Kentish, whose experience in those severe cases which happen to miners from explosions of hydrogen gas, shews it to be a good application; and, thirdly, because the turpentine *may* produce great benefit in a way which I do not perceive mentioned by Dr. Kentish, and which refers to certain principles of treatment, in relation to the sympathies of organs which I endeavoured to explain in the book on that subject, the Unity of the Body, &c.

We know that turpentine has a powerful effect on the kidney; we know that the sympathy between the skin and kidney is manifested in certain alternations of secretion, and phenomena already mentioned in former pages of this work; and that both organs are engaged in throwing off certain matters from the body. You have seen that the urinary secretion, in severe burns, is generally af-

fected; usually high-coloured. Now, in these cases, the skin has a large portion of its structure destroyed; we therefore cannot reasonably suppose but that the functions of the remaining part must be disturbed. Besides this, it has plenty of duty in assisting in the required repair; and therefore, if we could relieve it in any way, by promoting the action of organs having ever so general a community of function with it, and whose powers are not disturbed by any direct injury, we should, as diminishing the ordinary duty of the skin, probably increase its power in performing those which accident has rendered necessary. Many reasons render it extremely probable that the turpentine exerts a beneficial influence in this manner; since neither the application of stimulants nor turpentine to burns commenced with Dr. Kentish; nevertheless, we observe a rapidity of progress in his cases, especially when we recollect their severe nature, which, so far as I know, we do not witness when cases are treated in other modes. To shew you how extraordinary an influence certain excitement of the kidney may have on affections of the skin, I will tell you one example where the remedy employed, though not turpentine, was prescribed on a principle to which I conceive a portion, at least, of its beneficial operation in burns is to be ascribed. I have mentioned the case in a book already quoted; but it is so valuable that I make no apology for repeating it here.

A woman came to the Dispensary with a large superficial ulceration of the left leg, completely occupying the whole limb from the knee to the ancle. She was desired to rest, poultice, and attend to her diet and bowels. I was talking of sympathy to two gentlemen who were sitting with me at the Dispensary, when the next patient happened to be this old woman, æt. seventy-two; and, in explaining how they should examine cases, I said—"There now is a case, which, from the large surface affected, and from what you know of burns, would suggest the probability that some of the parts which sympathize with the skin will here be well marked. Now," said I, "first try her alimentary canal." Her tongue was not healthy, nor much otherwise; appetite good; and bowels regular. We then enquired as to the kidney. We found that she made a very small quantity of water indeed, and that, generally, very thick; but every now and then she said she made a considerable quantity of pale urine. I ordered her to omit all the medicine, and take simply a diuretic (the nitrate of potash with squills). The next time I saw the woman, you may judge my surprise at

finding that the whole of this immense surface had healed in one week; the kidney acting naturally. Soon after this, the leg became uneasy, when it was immediately relieved by the same measure. The other parts of the case are related in the book to which I have referred. I say, then, use Dr. Kentish's dressing, if it be at hand; if not, content yourself in the adoption of the principle, so far as the means in your possession allow you. As soon as the immediate disturbance, consequent on the accident, has a little abated, direct your attention to the bowels: but here, again, be vigilant over the powers of your patient; let the discharges from the bowels be full, free, and satisfactory, without being too profuse or accompanied by unnecessary excitement. Small doses of jalap and rhubarb, with a little cinnamon or other aromatic—or, if this be not at hand, castor oil—will be the proper remedies; and these should be assisted by an efficient injection of warm water.

I should not, myself, continue the stimulating dressings so long as Dr. Kentish recommends, unless I saw that there was an absence of any commencement of the processes necessary to repair. Dr. Kentish says, that after he discontinues them, if the reparative actions become slow or cease, touching the living parts with spirituous lotions will renew the reparative actions. The treatment should now be one which supports the system without exciting it, combined with great attention to the secretions, and simple dressings to the parts*; these being renewed about once every twenty-four hours. Various modifications as to diet, medicine, and measures directed to particular organs, will be suggested in different cases, and which of course must rest on the discretion of the practitioner, the principles being the same in all. With regard to the prognosis in burns, severe cases are to be regarded as dangerous accidents; nevertheless, under proper treatment, they often do well under apparently very untoward circumstances. In children, they are more dangerous even than in the adult; but I cannot speak very safely from my own experience; since, at the time I saw most of these accidents (I mean *severe* burns), the cases were certainly not properly treated, in many instances.

In all lighter cases, and in these I include alike scalds and burns, which occupy pretty large districts of skin—such as the greater part of a limb, for example,—you may generally predict a

* Spermaceti ointment, ung. lapid. calamin. or yellow basilicon with lard, in equal parts, or lard only; but the quantity should be very small, and spread on fine lint or linen.

favorable result: the cure may be very speedy or protracted, according to the powers of the patient and the more or less judicious character of the treatment. This should be essentially that of inflammation of the skin. If the reparative process progresses, your duty will be restricted to some simple dressing (of which a bread-and-water poultice is the best), and attention to the general functions of the body. Do not be snipping or otherwise interfering with the vesication; this is officious and unnecessary.

Burns and other extensive injuries of the skin sometimes progress very favourably to a certain point; there being a large surface covered, perhaps with tolerably healthy granulations, and a certain extent having already healed. In such cases the power is deficient, but seldom, I think, from simple exhaustion of nervous effort; there is always some condition of some organ on which it depends, in the absence of proper treatment. If the patient have improper food or bad air, these may the competent explanations. Dr. Kentish seems practically to have found occasional purges beneficial in these cases; but the particular remedy will be of course different, according to the circumstances. If a patient be in a hospital under these circumstances, the sooner he is discharged or made an out-patient the better. In some cases, a little increase of diet, with slightly stimulant applications to the sore, will be sufficient: but, in general, fresh air and attention to the general or certain individual functions of the body, as suggested by a more particular scrutiny than is generally bestowed, will be the most successful treatment: and, as in all cases where you wish to husband power, should the appeal to any organ, suggested as necessary, require the employment of a powerful medicine, you will obtain advantage by endeavours to excite it intermediately through some organ with which it may sympathize; provided this excitement involves agencies of a more simple or less disturbing kind. Burns are very often presented at the Dispensary where the processes are going on slowly or unkindly, and where there is a sort of irritative erysipelatous inflammation surrounding the part: in such cases you will find almost always some impaired function or other; and that, whilst you are correcting this, the application of some leeches on the inflamed surface will contribute to accelerate the reparative processes.

One very important thing, in relation to all reparative processes whatever, I should mention: that in adjusting the quantity of support (and especially the quantity of stimuli, as wine or beer, should

that be necessary), you should ascertain well the previous habits of your patient; for, if they have been characterized by the free use of stimuli, the constitution may require an extent of allowance which in ordinary cases would be highly prejudicial. In old persons also, we are obliged to be very careful, in all cases of local injury, not to allow the powers to sink too low, by suspiciously watching any real indication of their decline; and, though stimulants should never be given otherwise than with a sustained recollection of their exciting, as contradistinguished from their strengthening properties, yet in such persons a liberality in this respect is advantageous, which in younger subjects would be injurious. In Dr. Kentish's cases, the benefit apparently attending the continued allowance of beer or wine may probably have had more reference to the previous habits of his patients than to any necessity arising abstractedly from the nature of the injury; since, in all cases whatever, requiring repair, experience impresses nothing more forcibly than this—that whilst any thing which gives strength is of the greatest utility, yet it is a necessary condition that it only produces a very measured excitement. The most nutritious diet, therefore, with the addition of wine or porter, according to circumstances, consistently with the avoidance of excitement, seems the point of excellence; and the most unequivocal evidence of this is an *increased power* of pulse with a *diminution* of *frequency*.

The contraction which I have formerly remarked as characterizing the cicatrization of all wounds, when multiplied, as it were, by the vast surface involved in the healing of extensive burns, becomes a source of great inconvenience. Thus, we find parts so contracted as to interfere with their functions, limiting the motions of joints, as in the arm, or drawing down the face, and everting the lower lip; and thus subjecting the patient to an annoying dribbling of saliva, imperfect articulation, and great deformity. The prevention of these occurrences consists in placing the parts in their natural position, and retaining them there by bandages, splints, or other means appropriate to the situation, not only until the parts have healed, but for a considerable period afterwards. We are, however, often called upon to relieve these cases where we have not had the treatment of the burn; and it becomes requisite to set the parts free, and preserve them, by the measures already mentioned, in their natural position for the time stated.

In some cases, a simple division of the cicatrix is all that is required, so far as the knife is concerned: in other examples, the

parts are so disposed that this simple division is impracticable. Mr. Earle has proposed to dissect out the cicatrix, and then preserve parts in their natural position, to which they are thus restored: and I believe that the experience of that gentleman renders him satisfied with the measure. In all cases, however, where a simple division of the cicatrix will enable us to restore the limb to a natural position, the severer measure of dissecting out the cicatrix will probably be unnecessary: in illustration of which, I may relate a case. I was called to relieve a contraction in a boy's arm, which was bent to nearly a right angle, by a contraction consequent on the healing of an extensive burn; the cicatrix extended from the lower part of the arm down to the thumb, which it had bent inwards towards the wrist, so as to render it nearly useless.

As the removal of the whole cicatrix would involve of course very severe suffering, I was desirous of trying what might be effected by a simple division. Selecting therefore a portion of the cicatrix that appeared most concerned in the contraction, which was opposite the bend of the arm, I ran a sharp-pointed knife deep through the contracted integuments, and, cutting outwards, divided the cicatrix. The arm became immediately freed from confinement, but in a much less degree than I had anticipated; and, on feeling the wound, I discovered that the cellular tissue had become thickened and increased to a still greater depth than that included in the incision. I was proceeding therefore to divide or remove this to such extent as might be necessary, and in such a situation, safe as regarded the vessels, when the boy became so desperate and unmanageable, that it was found impossible to proceed without further assistance. I therefore placed the arm in a splint, adapted to the utmost extension which the division of the cicatrix had rendered practicable, and directed it to be retained steadily in that position. I was much pleased to find, on the removal of the splint, that the arm could now be extended to a still greater degree than the curve of the splint allowed. Another splint was therefore immediately made, adapted to this increased extension; and, as this became still greater, another splint was provided, and so on until the limb became perfectly straight, when it was placed in a straight splint, and kept there in the manner I have already recommended. I find, from Mr. Earle, that, even when the cicatrix is dissected out, the contraction is not always immediately remedied; but that, by bringing the edges together, or approximating them as nearly

as may be convenient, and keeping the parts in position, the desired results gradually take place.

The older surgeons, however, were acquainted, it appears, with similar and scarcely less efficacious modes of proceeding. Wiseman (p. 442), gives the following case. "A boy came out of the country with all the fingers of his right hand close contracted. I cut the cicatrix of each finger, and caused a *rowl* of wood to be placed under his crooked fingers, which being carried with bars to the inward part of his wrist, and fastened by screws, thrust the *rowl* gradually forward, till it had borne all the fingers before it, and by a *compleat* extension, restored them to their former liberty." He adds, "The wrysts and other joynts *would be* subject to the same inconveniences if they were not prevented by the knowing Artist, without whose help the best medicaments signifie little."

I believe I have now stated all that I consider necessary in regard to burns; and a summary of the subject will shew you that—

Burns are to be regarded as severe injuries to an important organ, requiring, in many cases, extensive repair, and consequently considerable and sustained power.

That this repair necessarily requires inflammation; which, again, in different cases, involves effusion, ulceration, sloughing, granulation, cicatrization, &c., according to the nature of the injury.

That inflammation may be healthy and reparative, or otherwise; and that, if otherwise, the remedies for its correction are just those adopted to other unhealthy inflammations; that leeches may be necessary: but that, considering the repair required, and the power necessary, general bleeding can seldom be either necessary or proper.

That the first effects of extensive burns are analogous to those accompanying any severe injury of any important organ,—that is, a state of depressed power:—that this is succeeded by excitement, and in burns very rapidly.

That if patients die with burns, they die at periods, with symptoms and under circumstances strikingly analogous to those which precede death under any other species of severe injury.

That the treatment consists, first in restoring the powers from the immediately depressing effects of the injury, and then gradually withdrawing that artificial mode of stimulation as the subsidence of such disturbance leaves the œconomy in a condition fit for conducting the necessary repairs.

That in the process of this, the sustentation or increase of power depends on principles alike applicable to all cases of extensive repair : that it consists chiefly in plain nutritious diet, and in the correction of any disturbed function; which disturbance always impairs power. That, in certain cases, this will include the addition of porter or wine, according to the severity of the case and the peculiarities of the patient.

That the local treatment proceeds in harmony with the general :—1st, one of a stimulating character ; 2ndly, the reduction of this to such applications as sooth the surface by protecting it from exposure, and render it otherwise comfortable,—that, as in regard to the constitution, so in regard to the injured parts, the resumption of stimuli may be, in certain cases, necessary.

That slight burns seldom require much interference, the inflammation being seldom more than is sufficient for the repair required: that in these, however, in certain cases, unhealthy inflammation is set up, which must be also met by the means recommended generally in unhealthy examples of this process.

That, in all local injuries, we must regard the injurious influence directed against the general safety of the œconomy as practically compounded of two forces—the absolute intensity of the injury, and the particular condition of the body at the period of its infliction.

That this may sometimes give, even to trifling burns, characters by no means necessarily arising from such accidents, as in the example of inflamed absorbents, &c. quoted.

That the principle of correcting or relieving functions, by appeals to the sympathies existing between different organs, is to be held in view as very important in burns, both in relation to the nature of the organ injured, and as correcting those conditions on which the occasionally protracted healing of such cases appears to depend.

And, lastly, that the phenomena of burns, as giving us examples of recovery from injuries of a nature and extent which would be elsewhere certainly destructive, afford a beautiful illustration of the preventive tendency of the law of inflammation, which determines that process to the cellular tissue and the skin, representing the exterior investments of the body.

APPENDIX,

CONTAINING A FEW

GENERAL AND ELEMENTARY REMARKS

ON THE

STRUCTURE AND FUNCTIONS OF THE BODY,

DESIGNED TO

ASSIST THE STUDENT OR UNPROFESSIONAL READER.

APPENDIX.

In the schools, the student generally commences the study of Anatomy and Surgery together. In order, however, that he should fully avail himself of the most elementary parts of his surgical lessons, it is necessary that he should have a general idea of the body. Without this, also, the unprofessional reader can scarcely understand the most simple propositions in regard to medical science; or, at all events, without a labour that is very unnecessary. These considerations have induced me to subjoin a few remarks, of a very elementary nature, on the structure and functions of the body.

In the first place, you should understand how the body is built up and maintained in repair; and, in explaining this, the first thing necessary will be to enquire into the source of the material employed. Now, all animals have the power of converting various substances to the nature of their own bodies. The power is various in its extent and kind; but no animal is absolutely without it. It is sometimes called assimilation and digestion; you will see the meaning of these terms immediately. The conversion of food into the various structures of the body implies the healthy performance of very many functions. First, the food is converted into chyle; this is the business of the digestive organs: then it is conveyed into the general mass of the blood; this is done by the absorbents. It afterwards undergoes certain changes, by being passed through the lungs; and is finally distributed to all parts of the body by the arteries, the minute ramifications of which fabricate and deposit the material required.

The whole of these processes constitute assimilation, strictly so called; the first step is digestion. The parts directly engaged in this important function are the alimentary canal, liver, and perhaps

spleen; the pancreas or sweet-bread; and some other salivary glands. In all animals, digestion has this in common; that the matter to be digested is brought in contact with some surface of the animal, either internal or external; and the first step is the conversion of such matter into a more or less fluid form; in fact, a solution of it. So far all animals are alike; but in many other points they differ. Some animals can digest almost all kinds of food; some only vegetable; some only animal matter; some, again, can only digest a limited number of articles from these kingdoms of nature; and there are many who appear to live on a single article. Then, again, the processes to which the food is subjected, previous to its digestion proper (solution), differ. In some animals, the food is simply brought in contact with the digesting surface. In others, it is simply divided in the first place; and, in a third kind, it is ground down into a much comminuted state before it is presented to the stomach. In many animals, this is managed, as you know, by the teeth placed in the mouth; in others, it is effected either by a strong muscular stomach, or by certain processes in it answering the purposes of teeth, as in the gizzard of birds, and stomach of the lobster, respectively. These differences in animals are found to be connected with corresponding differences in the form and complexity of their digestive organs. Some animals are little else but stomach; some have the stomach in the form of a single sac; some have it representing several cavities; then, again, some possess organs in addition to the digestive apparatus; and we observe a gradual rise, as it were, into the more complex and highly developed digestive structures in man. Yet there is nothing sudden, nothing abrupt, in the chain formed by the different variations in structure; all is harmonious; every link represents a gradual, and only a gradual, change; the obvious mechanism is different; the plan diversified: but the principle is alike; the result the same; viz. the conversion of food to the nature of the individual. But the adaptation of plan has an intelligible reference to the kind of food on which the animal lives; so that, in a vast multitude of larger animals, a comparative anatomist can tell, from any one part of the digestive apparatus, the teeth inclusive, on what the animal was destined to live. Animals that live on vegetable substances have one plan in their digestive apparatus; those which live on animal food, another; and those which digest both, a digestive apparatus that partakes of the character of both plans of organization. I need not say that this is

the case in man; and I now proceed to give you a sketch of his digestion.

The food, having first usually undergone some preparation, and having been masticated by the teeth, is conveyed into the stomach, where it undergoes a solution, the surface being first softened, and so on from without inwards, until the several portions are dissolved; as the solution* proceeds, it is gradually urged forwards into the next portion of the canal, which we call the duodenum; there being between these two parts—that is, the stomach and duodenum—a contracted portion, which is called the pylorus. In the duodenum, the digested aliment is seen adhering to all sides of the bowel in the form of a whitish cream-like† fluid; but, as we trace the canal onwards, we find the contents assume more or less of a yellow colour. Now it is into this duodenum that the liver pours the bile, or yellow, soapy fluid; and the pancreas or sweet-bread also pours an aqueous secretion, allied in its properties to saliva. The digested aliment is passed onwards by a gentle worm-like, undulatory motion of the intestines, until it reaches a spot where the canal suddenly changes its character, becoming much larger; this larger part being provided with a valve, which allows the contents of the bowels to pass onwards from the smaller intestines into the larger, but which prevents any movement in a contrary direction. This is, in fact, the commencement of the large intestine, which, pursuing a course upwards on the right side, crosses over the abdomen; then descending on the left side, it makes a sort of turn over the edge of the pelvis, and then proceeds downwards to the anus, where it terminates.

Now, although the whole canal from the mouth is continuous, we speak of different parts of it by different names, calling the whole the alimentary canal. This canal, then, may be regarded as

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* The notion that the food is first converted into an homogeneous substance, called chyme, is not a true representation of the matter. In all the cases which I have examined, the solution takes place in the manner described in the text. This I have formerly observed in a book on "The Various Forms of Porrigo, &c." The secretion of the stomach to which we proximately attribute the solution of the food, is a bland, transparent fluid, having, during digestion, a slightly acid property; but nothing in its chemical composition explains its wonderful power.

† This is the chyle, which is a fluid very analogous to blood, but wanting the colour. It separates like blood into a coagulated portion and some serum; and contains fibrin, albumen, sugar, and some oily and saline matters.

made up of the stomach and intestines; the intestines of the small and large. First, then, after the gullet, we have the capacious bag, the stomach; then the small intestines; then the large. That portion of the small intestine next the stomach is called the duodenum; to the remainder, we apply the names jejunum and ilium. There is no natural division between these last; the small intestines have, in their interior, certain folds, which are calculated to impede the progress of the nutritious fluid, and yet not to prevent it; and they are called by the somewhat whimsical name of valvulæ conniventes, as if they connived at the passage of the matters they were calculated to detain: as the nutritious fluid becomes less, these valves become less numerous; and it is to this portion of the small intestines that we give the name of ilium; the upper portion, that is, nearer the stomach, being the jejunum. The large intestines we divide into the colon and rectum. In the colon, we speak of the following parts: that part in which the small intestine terminates is somewhat more capacious than the rest, and is of a bag-like form; it has also a little, long, blind tube going from it, pervious towards the cavity of the bowel, but closed at the other end. This is called the vermiform or worm-like appendix of this bag, which we call the head of the colon; and we add the term blind from this worm-like appendix; so that, technically, the name of this commencement of the large intestines is the cæcum caput coli; and we generally call it the cæcum. The large intestine now proceeds upwards on the right side (the ascending colon); then crosses over the abdomen, forming a sort of arch (the arch of the colon); and then descends on the left side (the descending colon), where, turning over the brim of the pelvis (sigmoid flexure of the colon), it ends in a curved bowel (improperly, therefore, called the rectum), which terminates at the anus.

Now, from the whole surface of the alimentary canal, the nutritious fluid is absorbed, and carried by vessels, called absorbents, from smaller into larger trunks; which, ultimately terminating in veins near the heart, thus pour their contents into the general mass of blood, where we will leave it for the moment, only recollecting that it was poured into veins; mixed, therefore, with *venous* blood.

We will now say a word or two about other organs, which I mentioned as pouring their contents into that part of the alimentary canal which we called the duodenum. One of them was the liver, the largest organ of the body. A healthy liver presents much the same general appearance as the liver of other animals; it is placed

on the right side, and extends a considerable distance across the centre of the upper part of the abdomen, even to the left side of it. In man, and in many other animals, it pours its secretion (the bile), *first*, into a sort of little reservoir (the gall bladder), from which it is gradually expelled into the duodenum, as I have mentioned. In the same situation, the pancreas or sweet-bread also pours its fluid. Deep in the left side of the upper part of the abdomen, you find the spleen (the melt of animals), which does not pour any fluid into the alimentary canal, that we know of, and the use of which is entirely unknown. It returns its blood, however, by a large vein, which, uniting with another large vein returning the blood from the bowels and other parts, forms a vein larger than either, which proceeds to the liver, in the substance of which it ramifies, and from which we believe the bile to be secreted. This large vein is the vena portæ of the liver; and its communication with the splenic vein, and with that returning the blood from the bowels and other parts, readily enables us to understand how embarrassment in the circulation of the liver may affect the spleen or the bowels; of which latter many diseases of the rectum, as piles of different kinds, are examples; and which exemplify what is so often seen—viz. the seat of disease being in one place, its cause in another.

It is necessary to observe that no food we can take is wholly nutritious; there is more or less in all kinds which cannot be made use of, and this it is the especial function of the large intestines to discharge. When the food reaches the cæcum it undergoes a remarkable change, both in colour and still more in odour; and many circumstances induce us to believe that some little nutriment may still be obtained from it; for that the interior surface of the large intestines is capable of absorbing nutritious matter, we learn from the occasional support derived from intestinal injections thrown into these bowels, when we cannot give food by the stomach. The alimentary contents, however, when they reach the large intestines, are now moved on more quickly until they reach the lower bowel, through which they are ultimately discharged. This bowel is furnished with a circular muscle at its extremity, which, whilst it prevents the alimentary contents from passing inconveniently, still readily yields when they have accumulated so as to excite a desire for their discharge.

I have said that the nutritious fluid is absorbed from the whole surface of the alimentary canal. The vessels which execute this office, from the white colour of the chyle, are sometimes called the

lacteals. Now these absorbing vessels exist in every part of the body: they are constantly carrying off old material from the parts which they occupy, and carrying it into the circulation, whence it is ejected by some one of the excretions. In the alimentary canal, the absorbents take up a vast quantity of new material; as it were, a fresh supply: all absorbents carry their contents first to certain bodies which we call glands (popularly kernels), which glands seem to examine, as it were, and perhaps impress some change on the matter brought to them. Now, a great many of these are placed in a fold of membrane (which I shall presently speak of), and which secures the small intestines in their situation, and which we call the mesentery: we therefore speak of the mesenteric glands; and although we cannot be said to know the precise nature of the change wrought by absorbent glands on the fluids brought to them, before they are allowed to pass onwards through these glands to the circulation, yet the consequences of disease of these glands shews their functions to be important; for if the mesenteric glands be much diseased, patients generally die—the appetite being craving, but the body emaciated; because, even if digestion take place, the digested fluid either cannot get through the diseased glands of the mesentery to the circulation, or cannot get those changes impressed on it which are necessary to its becoming serviceable to the economy. I shall suppose, however, that myriads of absorbing vessels, which terminate in the villous interior surface of the intestines, have taken up the chyle, have conveyed it to the glands, and these have allowed it to pass onwards by other absorbents, which, terminating in larger and larger trunks, ultimately discharge their contents into the veins near the heart, and thus mix the newly manufactured blood, or chyle, with the general mass of the circulation. It is now carried onwards to the right side of the heart, with the general mass of the venous blood.

And now we have to consider certain changes which are to be effected in the blood, of which the chyle thus forms a part; and this leads us to consider what is called the circulation of the blood, and the changes wrought in this fluid by respiration.

CIRCULATION.

The circulation of the blood accomplishes primarily two objects: first, the supply of all parts with a fluid essential to their life; and, secondly, the return of any quantity which is not required, or which has undergone changes unfitting it for the purposes of life, to certain parts (the lungs), where it, and any additional fluids which may have been mixed with it, undergo those changes which refit it for the nourishment of the body—for being again distributed. The principal organ in its distribution is the heart; the pipes through which it is carried are the arteries; those by which it is returned are the veins, which ultimately pour it again into the heart, but not into the same chamber (ventricle) whence it was distributed; for this chamber, to which it is returned by the veins, contracts and urges it forward to the lungs, when, having undergone the change required, it is now sent back to the other chamber of the heart (the distributing chamber), where it is urged forwards to all parts as before.

We thus see that we have two chambers, as it were, in the heart, which only communicate through the tubes which convey the blood from the one to the lungs, and return it to the other from these bodies. These chambers, however, are divided into two compartments, called auricles and ventricles, and, as in animals, they are placed right and left, and somewhat inclined towards these sides in men, we speak of the right and left sides of the heart. Now it is to the right side that the blood is returned, and this we will call the venous, or right side; and it is from the left, that, having undergone the changes in the lungs which make it arterial, it is distributed; the point of which we feel beating on the left side, between the sixth and seventh ribs, and which we will therefore call the left or arterial side.

You will now, I think, be able to follow me in tracing the course of the blood more particularly. As it is a sort of circle, it matters not where we begin; so let that be from the point of propulsion to all parts of the body, that point being the left or arterial ventricle of the heart. This ventricle, on receiving the blood, contracts on it, and urges it first into a large pipe or artery, the aorta; this giving off a number of branches, these divide and extend in every direction, and convey the blood to all parts of the body. When the blood arrives at the part which it is to nourish, the arteries subdivide until they become exceedingly minute, and then they gradually

become veins, which veins, at first also exceedingly minute, gradually coalesce; and this continuing as they progress towards the heart, they continue to form fewer and larger pipes, until at last only two remain, and by these the blood is poured—returned, in fact—to the right or venous side of the heart. This side has, as I said, a divided chamber; the division which the blood first reaches is called the right auricle, and, by contracting, urges forwards the blood into the ventricle; from this it is again urged forwards to the lungs, by a vessel which, dividing and subdividing, carries it through the lungs; these ultimate subdivisions again begin to form larger trunks, and ultimately return it by four pipes* into the left or arterial side of the heart; but first to the chamber called the left auricle, which (as on the right side), contracting, sends the blood into the left ventricle, which is the point where we started, and whence, as I have said, it is distributed to all parts of the body.

Now, when the blood leaves this point, it is, as I have stated, arterial, and of a bright scarlet colour; but when it has reached the part which it is to nourish, it gradually loses this colour; for no sooner do we find it in a vein, than we see that it has become dark red or purple. This colour it retains until it has been sent by the right side of the heart through the lungs, where it again becomes scarlet; in which state it reaches the left side of the heart, which is again to distribute it to the body.

When we speak of the circulation of the blood, we refer generally to the distribution of the blood from one side of the heart (the left) and its return by the veins to the right side. When we speak of the pulmonary circulation, we mean merely that transmission of the blood from the right side of the heart through the lungs, and its return to the left, or distributing chambers, on that side of this organ. Now, a great point in the distribution of the blood is, that the distribution be equal; and this not only as regards the momentum with which it is to move in different parts, but also in the quantity supplied to them. But when we use the term equal, we do not mean that it should be exactly alike, either in the quantity supplied or in the momentum or velocity with which it moves; on the contrary, there is every thing, short of absolute demonstration, to convince us that the circulation is different in different parts, in both these points—that is to say, that some parts have more blood than

* Pulmonary veins.

others, and that the blood circulates in different parts with different velocities; and farther it may be observed, that in disease we can distinguish that the blood sometimes flows more or less quickly in different parts. That the equality or adjustment of the actual conditions of parts in this respect is important, we infer from the fact that obvious disturbance of it produces disorder of some kind or other, and from the fact also, that this disturbance seems an *element*, at least, in all disorders. The problem involved is very complex, being in fact the distribution of a fluid by an organ through pipes, the branches of one main pipe, to parts differently distanced from the propelling power; and notwithstanding that the pipes reach all parts, yet with differences as to supply, and with different velocities. Now we cannot entirely explain how this is accomplished: in no *known* hydraulic machine would it be possible; yet we can see provisions calculated to effect the object, although we cannot imitate them. In the first place, all the distributing pipes are elastic; and, secondly, they have a power of contracting on their contents beyond that allowed by the sphere of their elasticity. And again, we observe that, in the angles at which the different distributing pipes branch off one from the other, they present every conceivable diversity. We also observe another very curious circumstance—viz. that no part depends on any one source for its supply; that in all cases one, and in many several, pipes might be obliterated without the part in question being deprived of its supply of blood. Now, we believe that these circumstances, especially the elasticity, the contractile power, and the angle at which arteries are given off, are the means through which the adjustment of the circulation is effected. We see the contractile power of the arteries greatest as they become most distant from the propelling power (the heart), near which power their greatest elasticity seems serviceable in protecting the vessel from injury, under circumstances (not unfrequent) of unnatural force in the propulsive power of this organ.

Hydraulic influences, as resulting from the different angles of the arteries, have been discarded by high authority as explaining the distribution of the blood; but when we know that the progress of a fluid through tubes is influenced by this circumstance, and that in the arteries these angles present endless diversities, it is difficult to believe that they do not exert some influence. It is true that in the pipes whence we draw our hydraulic notions, we have neither

elasticity, nor that contractility which is superadded to the arteries; yet all the arteries have these properties, and, *ceteris paribus*, it seems difficult to explain how these hydraulic influences should not still be exerted*. Besides, although we can by no means explain the various angles of arteries on hydraulic principles, yet we see something in harmony with them too. For example, when blood is to be conveyed to a distant part, we find that the arteries divide at acute angles, as in the brachial, femoral, and their primary subdivisions, affording hydraulic facilities to distant parts; whereas, when the blood reaches the part, we usually observe hydraulic impediments, so to speak, in the distribution and subdivision of the vessels. Again, when the parts supplied are near the heart, where the force is acting most efficiently, we find the vessels going off at right angles, or nearly so; thus affording, so to speak, hydraulic impediments, as we see in the intercostal arteries.

Another very curious thing, and which points, I think, very strongly to hydraulic influences, is the intervention of arches in different parts, from the concavity or convexity of which the supplying arteries branch off. The arch of the aorta is by no means to me satisfactorily explained by the mere circumstance of the heart being placed superiorly to many of the parts to be supplied; for this does not explain the arches which we see in the circulation of other parts, as the hands and feet. Then, as regards the brain, the hydraulic influence is admitted; for, as the blood approaches the brain, we see in many animals provisions obviously calculated to moderate the current of the blood before it enters this organ, either in the tortuous course of the vessels, or in their division and reunion; and whilst this is most remarkable in animals whose heads are more in a line with the heart, it is still more remarkable in animals which graze than in those which have not the head so constantly favouring, by gravitation, the blood's momentum. Thus the impediment afforded by the tortuous course of the cerebral artery in man, is greater in the plexus found in the lion, and still greater in that found in some herbivorous animals. However, I just throw out these hints as matters of interest; my object here is not physiolo-

* The connection of the distribution of water to the earth and its inhabitants with the ordinary laws of attraction and gravitation,—and its proximate dependance in many cases on the known laws of hydraulics,—are very interesting and demonstrable; and there is no reason to believe that the distribution of a fluid in an animal body necessarily requires a different law.

gical, further than as impressing by such considerations a few very elementary facts in regard to the actions of the body.

We have reason to believe that the veins also possess some power of contraction, and we know that they are slightly elastic: we must, however, refer to the former property the exceedingly varying size of the vessels. We also know that the superficial veins have valves, which allow the blood to move towards the heart, but which oppose it in the contrary direction; the action of muscles also we know to help the progress of the blood through these vessels. It has been suggested, that during respiration a vacuum is formed in the right side of the heart (into which you will recollect the blood returns), favoring the venous circulation. It is probable that all these causes have some effect; so that the distributing forces may be, first, the force of the heart; second, the elasticity and contractile power of the arteries; third, hydraulic arrangements in the course and angles of the arteries: the returning forces; the *vis a tergo* of the heart and arteries; the elasticity and modified contractile power of the veins, their valves and muscular action; and, probably, hydraulic arrangements here also. The idea that you should have of an artery is an elastic pipe, which remains open when you make a section of it, having also, in the living body, a power of contraction and dilatation, and carrying scarlet blood from the heart to all parts of the body; a vein being a tube which, unless it be large, collapses when a section is made of it, having therefore little elasticity and little contractile power, but possessing a small degree of both, and carrying (returning) purple blood from all parts *to* the heart.

Notwithstanding the foregoing, which I believe is the general idea of the forces by which the circulation is carried on, I cannot say that it appears to me satisfactory. The pressure of the heart's action on a long column of blood, filling a number of tubes, would not only be sufficient to impel the blood through them, but even to injure the tubes, were not these tubes elastic on the one hand, and the blood free to move on the other; for, though the power of the heart be small, yet when it is multiplied by the surface of the arteries, in conformity with the law by which fluids press equally in all directions, it must be enormous, and even dangerous, were it not for the provisions which I have mentioned. I should therefore myself be rather disposed to refer the contractility of the smaller arteries to the offices of growth, nutrition, and deposition generally, than as being at all necessary to help the circulation. There seems, indeed,

to me no subject more promising either to hydraulics or physiology than the study of the circulation, with regard to the principles of hydraulics. It is full of interest, at all events; and I cannot help thinking that physiology and hydraulics might each be made, by such an investigation, to improve the other.

It may be right to make a few remarks now on the fluid thus circulated (the blood). The blood is the material by which all parts are nourished and sustained; therefore it must be distributed to all parts, as you have already seen: and for this purpose its fluidity is, of course, well adapted. You have seen that its colour is red; purplish-red in the veins, scarlet in the arteries; but in many animals the colour is absent; and in some again, red blood is only distributed to certain organs: even in man, there are many parts not supplied with red blood.

The blood, when out of the body, spontaneously separates into certain parts: first, there is a clot (the crassamentum); secondly, a fluid, greater or less in quantity in different cases (the serum). In the clot, or crassamentum, we again distinguish the fibrin, or greater mass, and the colouring matter; and as this is found, when placed on the field of a microscope, to consist of globules, so we speak of the clot as commonly consisting of this fibrin and red globules. We find also, that if the serum be subjected to moderate heat, it also presents two parts, the greater portion coagulating, and forming what we call the albumen (as is the white of an egg), and another portion, which may be pressed out of this in a fluid state, to which we give the name of the "serosity."

I may observe that the coagulum which forms spontaneously, and which we call the crassamentum, or clot, forms more slowly in some cases than others; and that where this happens slowly, the red globules (the heaviest part of the blood), sinking deeper into the clot, leaves the surface of a lightish yellow colour: this is what we call the buffy coat. This is supposed to characterize the appearance of blood in inflammation; but we cannot safely adopt this conclusion, because the appearance is often absent where inflammation is certainly present, and often present without inflammation: it seems to have more relation to excitement than to inflammation. With regard to the composition of the blood, you will find some differences of opinion in chemists, both as to matters contained in it, and also in their relative quantities; but the subject forms an interesting chapter in almost every work on Chemistry.

The following is one of the analyses given by Dr. Turner in his work on Chemistry:—from a paper by M. Lecanu.

Water	780·145
Fibrin	2·100
Colouring matter	133·000
Albumen	65·090
Chrystalline fatty matter	2·430
Oily matter	1·310
Extractive matter, soluble in water and alcohol	1·790
Albumen, combined with soda	1·265
Chloride of sodium ——— of potassium Carbonates of potash and soda Sulphates ——— ——— Phosphates ——— ———	8·370
Carbonates of lime and magnesia Phosphates of lime, magnesia, and iron Peroxide of iron	2·100
Loss	2·400
	1000·000

There is a great deal to be said on this or any other analysis; but my object is only to give you a general idea of the subject. The red globules are said to be of different shapes im different animals; but in all microscopical observations the sources of fallacy are such, that we seldom find observers agree in the results of their observations. I chiefly wish you to understand, that it is from this fluid that the various parts of the body are built up, and that the necessary changes by which the blood becomes converted into bone, muscles, and the various structures, are wrought by the minute vessels of the part. The blood undergoes certain appreciable changes in some diseases; but it is highly probable, from all the facts, that there are many others not detectable by any chemical mode of proceeding at present known. The fact I have just adverted to, however, should be borne in mind; because, if it be true that parts are built up by the conjoined agency of certain vital properties of the blood and the actions of the minute vessels, you will at once perceive that no change of structure can take place without some alteration in the properties of the blood or the action

of these vessels. In such cases, it is possible that the fault may be sometimes attributable to the material, in others to the workmen, as Mr. Hunter calls the minute arteries; and, in examining these points, investigation of the material would naturally lead us to enquire of the manufacturers of it.

Now, these are the digestive organs, primarily; the various glands of the body, through which the absorbents carry the fluid, so prepared, to the general mass of blood; and lastly, the lungs, in which the blood is subjected to air—respiration. But as all these processes are subservient again to a superior power, as it were, so the fault may be primarily there: this power is represented by the nervous system, on which I shall add a few remarks presently.

The changes which the venous blood undergoes, in order to fit it for distribution by the arteries, is effected by respiration; in which the drawing in of the air, or inspiration, produces a great change both in the blood and the air so inspired. The statements in regard to some points of the details of this process are so conflicting, that I had better merely mention here that the air drawn in loses a portion of its oxygen, and that this is replaced by carbonic acid, and this in pretty equal quantities, so that the blood becomes changed from venous to arterial: the obvious physical change, and one, probably, abstractedly unimportant, being a change from purple red to scarlet. That this change is consequent on exposure to air, that this exposure is necessary to all animals, we know; but it is certain that the vital powers play some part in the process, which cannot be explained by any chemical investigation.

The changes thus produced in the blood are, as I have said, chiefly the result of respiration; but there is the strongest reason for believing that the skin contributes to them so far as regards this absorption of oxygen, and the throwing off of carbon; so that we really breathe partly by the skin. Dogs perspire very little, apparently; but we always see the lungs very hard at work during exertion, which we do not notice in so marked a manner in animals who perspire freely, as horses. I may observe that the heat of an animal, and the power it possesses of maintaining uniformity of temperature, have a general relation to the development of the lungs and the quantity of oxygen consumed by them; and, as in combustion, oxygen disappears and forms an oxide, which in respiration is represented by the carbonic acid, so the heat of animals has been supposed to be thus generated. Many very serious diffi-

culties lie in the way of this tempting conclusion, and which merely conduct us to this point—that life plays some part in the whole process, to which all the other phenomena are subservient.

You have seen now how the blood is made, first, by the fluid elaborated from the food by the digestive organs; how this is carried by the absorbing vessels, through certain glands, to the general mass of venous blood; how it is ejected from the right side of the heart through the lungs, undergoing here the final change which fits it for distribution to the body, by the left side of the heart, to which it is then conveyed. Now you must understand that absorbents exist in every part, and as the minute arteries lay down new material, so the absorbents of every part remove the old; the body is thus always undergoing mutation of its parts, new materials being constantly deposited, and the old ones removed. When these two sets of vessels act in harmony, the natural form of all parts and the general symmetry of the body are preserved; but if this harmony be destroyed, parts undergo either increase or diminution of volume. If the absorbents are more active than the blood-vessels, more is taken away than is deposited, and parts become smaller; if, on the other hand, their activity be small, or that of the blood-vessels too great, their increase of bulk is the consequence. In various diseases we see exemplifications of this: if the material be redundant, and the person otherwise healthy, then the material is laid up, as it were, in the cellular tissue, in the form of fat. But sometimes diseased actions, as we call them, accompany this too abundant deposition, and then such deposition may represent a structure similar to some others in the body, or altogether different from any, forming tumours, as we call them.

When parts are killed by injury, or perish under the influence of some action of disease, they are thrown off, by the absorbents removing the parts which unite them to the living structures. In this way, these vessels have functions of the highest importance; and the remembrance of the few facts which I have mentioned is of great moment in the treatment of disease. The absorbents carry the matters absorbed into the venous circulation; but first, as I have said, through certain bodies or glands, which seem to act like sentinels, and examine and probably produce some change in the fluids brought to them, before they allow them to pass on through other absorbents again to the blood. There seems reason for believing that, in some cases, the matter is of a very injurious character; since, whether in consequence of anything in the matter

itself, or of merely diseased excitement continued along the absorbent to the gland, we find that irritation, inflammation, and suppuration, are set up in the gland, and apparently with the effect of arresting the progress (either of morbific matter or of simple irritation) onwards to the absorbents nearer the circulation. The idea that you should have of an absorbent, is a fine, membranous, transparent vessel, having a power of contracting on its contents, and the function carrying a variety of matters; some nutritious, as the chyle; some that are to be ultimately expelled from the body as no longer of use to it.

Now the organs by which all matters which are either useless or injurious to the body are expelled, are the bowels, kidney, skin, and lungs. Of the bowels and lungs I have already spoken; and of the skin I have said that it contributes to the separation of carbon. The kidney is largely supplied by blood, from which it separates a variety of matters, the retention of which would be injurious. This it does by means of the secretion of urine; and we learn the exceeding importance of this, as well as other functions which throw off matters which are either directly injurious or no longer useful, by what happens from their retention. The urinary organs secrete a peculiar fluid (the urine), in which the matters, destined to be ejected from the body through this channel, are dissolved in various states of combination. The quality of even healthy urine will of course, therefore, vary much at different times, and according to the variety of duty imposed on the kidney, and especially by the digestive organs; for, if they do not do their duty in any way, the kidney is almost certain to have more to do; if matters taken up from the alimentary canal be not pure, the kidney and skin must separate them; so, if the bowels do not throw off the innutritious residue of digestion, we invariably find the urine loaded.

The following is an analysis of healthy urine, by Berzelius: A thousand parts contain of

Water	933·00
Urea	30·10
Uric acid	1·00
Free lactic acid, lactate of ammonia, and animal matter not separable from them	17·14
Mucus of the bladder	0·32

Sulphate of potash	3·71
——— of soda	3·16
Phosphate of soda	2·94
——— of ammonia	1·65
Muriate of soda	4·45
——— of ammonia	1·50
Earthy matters, with a trace of fluate of lime	1·00
Silicious earth	0·03

Various departures from this and every other analysis are observed, and yet there may be no disease. In other cases, disordered action in the kidney, consequent on the imposition of excess of duty, or other causes, leads to unhealthy secretion, giving rise to most tormenting maladies, as gravel and stone, in connection with which, the peculiarities of urine must be more particularly considered than I can do in this place. The liver is also an organ which contributes to carry out matters from the body, the retention of which would be injurious. The function of the liver, however, is very imperfectly understood, the secretion of bile being perhaps merely one of the functions of this vast organ. This secretion, however, evidently throws off something which would be injurious if retained; and contributes very materially to more than one process connected with the digestion of the food: for we find that digestion itself is performed very imperfectly, if the bile be deficient; and that the bowels seldom, in this case, throw off the fæculent remains of digestion as they should do. The bile is a yellowish, soapy, somewhat tenacious sort of fluid, which is found to consist of a number of salts, as phosphates and muriates of soda, in solution with water; and certain peculiar principles, to which the names of cholesterine, asparagin, picromel, are given respectively; but the analyses are so different that I have not thought it useful to transcribe any of them.

The organs which I have mentioned are those which make the blood, which distribute it, and which carry off either the old materials of the body, or any other matters no longer required. We will now then take a cursory view of the principal structures built up from the blood by means of the minute arteries; and, for the purposes here intended, it will be sufficient to mention bone, ligament, tendon, muscle, what are called the membranes of the body, and the cellular tissue.

The bones are composed chiefly of animal matter, in which is

deposited an abundance of phosphate of lime, to which they owe their strength and firmness. Sometimes small additions of carbonate, and even sulphate, of lime may be detected; but, in the human bone, phosphate of lime is the chief solidifying material. The skeletons of some animals (shell-fish, for example) are almost wholly made up of carbonate of lime. The animal matter in bone is chiefly gelatine, and therefore soluble in hot water: which happens when we make soup from bones of beef or mutton; there being in them, however, a small portion of albumen.

The bones form what we call the skeleton; and the general use which it serves is to contribute to the protection of parts, and to assist the powers of motion, by the addition of convenient mechanism. As examples of the protection it affords, I may mention the brain, and the heart and lungs, in each of which cases it forms a sort of box for the protection of the parts which it encloses, resisting forces of considerable violence, and provided with means for diminishing the effects of concussion; as jarring. To this the peculiar saw-like edges of the bones of the cranium probably, in a small degree, contribute; but the provision is still more remarkable in the chest, where it is necessary for other purposes. The chest is formed by a portion of the spine behind, by the sternum in front, and by the ribs on either side; but the cartilages or gristle, interposed between the joints of the ribs with the spine, and still more the long pieces of gristle which connect the ribs with the breast bone, give to the whole chest a remarkable elasticity; the effect of which is, that when, as in drawing in the breath, the chest is enlarged partly by the elevation of the ribs, the elasticity of their cartilages seems nearly of itself sufficient to restore the ribs to their former position: but of the mode in which the chest is enlarged in inspiration I shall have to speak again.

The spine is composed of twenty-four bones, which together form a canal for the reception and protection of the spinal marrow. This is a beautiful structure, of which I could not give you a good idea without the assistance of plates; but, whilst the spinal marrow is effectually protected, it is contained in a canal running through the whole spinal column, this column having considerable flexibility. This flexibility is, however, made perfectly consistent with the avoidance of any injury to the spinal marrow; and the object is chiefly obtained in this manner: that, although all the vertebræ have a certain degree of motion, yet this is very small: so that the result is a great flexibility of the whole column, with very

little motion in any one part of it; the greatest curve ever represented by the spinal marrow being very moderate in any one part, describing, in fact, but a very trivial aberration from a straight line. Between the bodies of the vertebræ, which are strongly bound together, there is a peculiar elastic material, facilitating the motion and elasticity of the whole column; there is nothing exactly like it in the body; and we simply call it the intervertebral substance. In some animals, and particularly in some fish, there are more extensive provisions of this kind,—fluid being interposed between the bodies of the vertebræ, so that the several parts of the colum ride, as it were, on a fluid, which yields in different directions according to the motions required by the animal. The mechanism by which the bones become subservient to the motive powers constitutes the various joints; and of the general structure of these I next proceed to speak. First, the bones which are to be joined are formed into a convenient shape, this generally implying an extension of surface (articular surface); next, they are covered by a beautiful stratum of highly elastic material (gristle or cartilage), over which a membrane passes, presently to be mentioned. The bones thus prepared are firmly bound together by very strong, inelastic, fibrous bands (ligaments), and then over the whole is thrown a sort of bag (the capsule), which includes the ends of the bones in one cavity. This bag is strengthened by numerous ligamentous fibres running over it. I must further observe that the whole interior of the joint is lined by a smooth membrane, which I have already mentioned as passing over the cartilage; and it is from this membrane that the fluid is secreted which lubricates or oils the joint, as it were; and which, from its resemblance to white of egg, is termed the synovia, the membrane being called the synovial membrane. So that here you have bones for strength; ligaments for security; cartilage for elasticity, to prevent jarring in the rapid or rude motions required; and oil for diminishing friction.

A rude imitation of all this occurs in the patent axle, except that there is no contrivance for the *continued* supply of oil. Further, the ligaments are exquisitely contrived for the admission of all motion which the form of the bones is calculated to render secure, or the moving powers capable of impressing on them, whilst they powerfully oppose any other. The joints also have a very low degree of sensibility, in harmony with the rough impressions to which they are subjected: but all this is immediately changed

on the occurrence of disease, when the whole apparatus becomes, for reasons referred to in the foregoing work, exquisitely sensitive. The bones then give support; they afford firm points for the attachment and action of the muscles or moving powers, and form joints of the structure required for the various motions: some joints are ball and socket, and admit of a very extended sphere of motion, as those of the hip, and still more remarkably, the shoulder; some are hinges, as the knee or elbow; some allow only of a very little motion, as that of the collar-bone with the blade-bone, which move as if they were one piece; but all joints have the *general* properties of which I have spoken: and now we will consider the parts by which they are moved.

MUSCLES*.

The powers by which the body is moved, and by which the joints are made to execute the different motions for which they are mechanically adapted, are the muscles (the flesh of animals); and they are so constituted as to be in harmony with the joints on which they act. That is, they are so disposed, that, whilst they can impress such motions on the joints as the mechanism of these parts safely allows, they can, under ordinary circumstances, produce no other.

If you examine a piece of flesh, you find that it is made up of fibres; but as these, however closely we may examine them, appear to be composed of an aggregation or bundle of lesser fibres, so we are accustomed to speak of those which appear as fibres to the naked eye, as bundles, or fasciculi, as we term them. In man, and many other animals, they are, as you know, for the most part red; in some animals they are, on the contrary, white; and in others, again, some are red and others are white.

Now, muscles have the curious property of contracting themselves, that is, of shortening their fibres; and, of course, when they do so, they must necessarily approximate their attachments; so that, if you wish to know the action or mechanical use of a given muscle, you have only to ascertain which of its attachments is the fixed point, when its action is immediately determined.

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* Muscles contain gelatine, albumen, a peculiar matter called osmazome, and certain salts; but they are chiefly composed of the fibrin of the blood.

You must not, however, conclude that a fibrous structure is necessary to a power of this kind; this is by no means proved; for we find contraction taking place, and with the effect of locomotion in some lower animals, where we can by no means safely infer the existence of a fibrous structure. So have we parts in the human body, of whose powers of contraction there can be no doubt, and yet in which we can hardly demonstrate a fibrous structure. Then, again, in some membranes, in ligaments and tendons, we have a very obvious fibrous arrangement, where we are tolerably certain that there exists no contractile power*.

When a muscle acts (shortening itself, in fact), it becomes very hard; it feels as if its structure had become suddenly condensed, as it were, and the change from its previous flaccid and soft condition is very remarkable. Microscopically examined, it seems that the fibres thus shortened are thrown into waves, in a zigzag form. I must observe to you, that, in many instances, muscles of great bulk act on surfaces comparatively so small, that were the whole muscle fixed to the part on which it acts, it would embarrass its motions, and entirely change the symmetry of the body. Joints, for example, already representing certain enlargements in different parts, would then become, as it were, immense tumors, in the situation which they occupy. In these cases the fibres of the muscles are gathered into smaller space, and fixed to a cord, which is attached to the part intended to be moved; and these cords are the tendons or sinews.

A tendon is a whitish, glistening, cord-like body, extremely strong, very inelastic, and of a fibrous texture. Inelastic, because any elasticity would obviously weaken the power of the muscle; since some of this would necessarily be spent in overcoming the elasticity of the cord, instead of the whole being applied in moving the part on which it acts. As the muscles act with great force, the sinews

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* It is very necessary that you should recollect these things; for the notion that contraction implied the necessity of a fibrous or of a muscular texture, has formerly led to very unnecessary difficulty. You would be surprised at the absurdity which was broached at one time in regard to so common a phenomenon as the contraction of the pupil, merely because, at that period, men had not demonstrated the iris to be either muscular or fibrous; and, at the removal of these difficulties, on finding that it had really a fibrous arrangement: although, as I have just said, the examination of contractility, either in man, and still more in some of the lower animals, shews that contractility is by no means necessarily associated with a muscular structure, nor even with one demonstrably fibrous.

on which they pull must necessarily be strong, or else the muscles would be continually snapping them; as indeed they sometimes do, notwithstanding. They are, therefore, not so strong as the muscles, since the latter occasionally break them ; nor can we say that under every circumstance they are absolutely inelastic: but they appear to be so far so, that the force of the muscles is not sufficient to call their elasticity into play. In certain dislocations it seems reasonable to infer that the tendons are not entirely deprived of elasticity, although the quantity is exceedingly small. Now the properties of all muscles are somewhat similar in kind; but we observe very curious and interesting varieties in their development. I have said that they are of a fibrous texture; that they have a power of contraction; and I may now add, that they cannot contract continuously ; at least, we know of no example in which we do not observe alternations of contraction and relaxation, although nothing can be more varied than the manner in which this is exemplified.

Some muscles contract only for a very short period, and then relax again. The heart is an example of this kind ; this muscle, through life, exhibits a constant succession of contractions and relaxations, in rapid alternation. Some muscles again are ordinarily in a more or less relaxed condition until they are required to perform their respective offices, when they contract, relax, again contract, and so on, as required: and as these are under the control of the will, they are called voluntary muscles. Some again have this remarkable difference, that their ordinary condition is that of contraction, and their relaxation only occasional; such are the sphincter muscles which close canals, as those placed at the neck of the bladder and the termination of the lower bowel.

We observe remarkable differences in different muscles in relation to their subjection to the will of the individual. Some are, under ordinary circumstances, completely under the control of the will, others entirely out of its dominion ; and, again, some are neither wholly subject to volition, nor altogether independent of it. All the muscles moving the various joints, those most directly concerned in moving one part on another, or in moving the body from place to place (locomotion), are under the control of the will; so that if I wish to raise or depress my arm, or to go to the other end of the room or elsewhere, I feel that I have the power to do so ; but if I wish to stop the beating of my heart, or to suspend certain actions that are constantly taking place in the muscular coat

of the alimentary canal, I have not the slightest power to do this. Then, in regard to my breathing, I observe the third case. If I wish to hold my breath, I can do this for a limited time, but still but for a short period; so that my respiratory muscles are neither within my control, nor entirely out of it: and this is very beautiful. If I had no power over these muscles (chiefly the diaphragm and abdominal muscles), all the other muscles would lose a great part of their function; because, whenever I wish to use the arm or leg, or both, with the greatest force, I am obliged to fix the trunk, in order that the muscles moving the extremities may have a fixed point to act on. Now, this I do by the simultaneous action of these muscles, which are ordinarily occupied in carrying on respiration, during which their actions are alternate; but when we fix the trunk, or exercise the function of straining, they act together: on the other hand, were these muscles dependent on the will for their action, I should never be able to sleep safely; because we know, that during sleep the voluntary muscles are in a state of repose; which cannot be, of course, the case with the muscles of respiration, which, being independent of the will, carry on this function safely through the night, enlarging the chest, for the reception of air, and again expelling it, as in the day. The modified influence which the will is capable of exerting over the muscles closing the apertures of the bladder and the rectum, are alike in harmony with the necessities and comforts of the œconomy. Matters no longer serviceable to the body are allowed to accumulate to a certain extent, and we then have feelings soliciting their ejection: but now the will has a certain power, and very nicely limited; contributing to our comfort and convenience on the one hand, without allowing a power the exercise of which would be prejudicial, on the other.

There are a few other circumstances which, even in this sketch, I may mention. Muscles appear to be highly organized parts; but they are not so sensitive as many others. They become strong and firm, and increase in bulk by exercise; and, on the contrary, dwindle and become soft by inaction. This is seen alike in the highly developed muscles of those accustomed to labour, and in the opposite condition of those who are sedentary or inactive. Besides these modified exercises of volition, there are some others which are also interesting: thus, the muscle closing the eyelids is ordinarily a voluntary muscle; yet, if the eye be in danger, or subject to intense light, I close it without any distinct recognition of volition, or I even close it involuntarily. So, after great fatigue, I may

wish to keep the eye open; but the lid gradually drops, and sleep supervenes. There are certain muscles in the internal ear—in the tympanum, in fact,—over which it is certain that I exercise a volition, but of a kind of which I am not sensible; although the power I possess of modifying the effects of violent vibrations of air, or of rendering the organ susceptible of very feeble ones, shews that I have the power of relaxing or contracting the membrane which covers the tympanum (the parchment of the drum) at pleasure.

I have already observed that muscles act with great force, and that, ordinarily, this is in harmony with the parts with which they are connected. But this harmony, and indeed any other of the characters of muscular action, may be changed by various circumstances attending on accident or disease. To some of these I have already alluded in speaking of the sympathies of these parts. With regard to the force of muscles, they will sometimes snap their tendons, tear off the processes of bone, or break asunder those to which they are attached; and, in certain cases, produce consequences still more serious. Thus, in great efforts, the pressure exerted by the diaphragm and abdominal muscles in fixing the trunk, will squeeze out the contents of the abdomen, causing what are commonly called herniæ or ruptures: and, in certain accidents, where they act under the influence of alarm, they will produce consequences still more frightful: thus, I have known this simultaneous action of the muscles of the abdomen and diaphragm compress the viscera so violently as to tear the liver. I recollect a man who fell from a suspended platform, on which he was cleaning the walls of a church. He stood too near the edge, and the platform swung away from the wall; he fell, and received a very severe oblique fracture of his thigh; this was put right, but he sunk and died; and examination discovered an enormous rent in his liver, which might have fallen double the distance without injury.

In these cases individuals instinctively struggle violently, and the actions of the muscles, I have mentioned, occasionally thus injuriously compress the viscera. I recollect that Mr. Abernethy used to tell us of a similar case to that which I have related. In the accident which occurred to the unfortunate gentleman who fell last year in the parachute,—a careful consideration of all the circumstances leaves very little doubt, that so much of the extensive injury as referred to the ribs, resulted from muscular action; since the other circumstances point very clearly to the manner

in which he must have fallen, and to the impossibility of the fracture of the ribs on both sides having been the effect of direct violence from the fall. I shall have occasion to mention the facts and reasonings to which this case leads, hereafter; for they are exceedingly interesting.

I must add a remark or two in regard to the abdominal muscles, and of the diaphragm. The abdominal muscles form the walls of the abdomen; the diaphragm is a muscle which divides the chest from the abdomen, forming a sort of floor to the former and roof to the latter. The actions of these muscles are numerous and important: the only one I shall particularly allude to, is that by which they conduct ordinary respiration. In inspiration the diaphragm contracts the convex surface towards the chest, which, rendering it of course flatter, enlarges the cavity: the abdominal muscles yielding, as the diaphragm, thus descending, displaces the viscera beneath it. The chest thus enlarged, air rushes in by the windpipe, and fills the chest; now the abdominal muscles, contracting in their turn, force up the diaphragm into its former condition, thus expelling the air again from the lungs, performing the act of expiration. Now there are many subsidiary powers, which are occasionally put in requisition in breathing, and many which habitually contribute more or less towards it: but still, under ordinary circumstances, respiration is chiefly performed by the alternate contractions of the abdominal muscles and diaphragm: and, as I have said before, when we exert the act of straining, these powers act together, and we feel that we must hold our breath whilst they continue to do so. I must not, however, say more on the subject of muscles in this place.

OF MEMBRANES.

The notion of a membrane is best conveyed by referring at once to a familiar example, for which I may suppose the bladder of a sheep or any other animal; not that membranes always form sacs, or that they are always as thick as the example quoted, which has other structures laid upon it; but as representing a thin stratum of animal matter. Now membranes have different characters. Those lining the chest and abdomen are examples of serous membranes; and we have other examples of them in the brain and elsewhere; but it will be sufficient if I give you a general idea of

their arrangement in the chest or abdomen. When you see either of these cavities opened in a sheep, ox, or any other animal, you perceive that the surfaces exposed are very smooth; this surface is the serous membrane of such cavities; and they are all disposed in the following manner.

Imagine that you have to line a box or other cavity with gold-beater's skin, or any other transparent material, and that your object was not only to line the box, but at different parts to throw a fold over some article which was to be contained in the box, and then carry the lining so thrown over the article back to the point up to which you had so far attached the lining; you would thus line the box and cover the article contained in it with the same material; so that each article in the box would be maintained in its situation by the fold of lining which you had thrown over it. If therefore you were again to remove the lining from off the different articles, they would all fall to the bottom, or out of the box, were it open, because you have kept them by this plan really on the outside of the lining. Supposing also that you had secured some articles so close to the box as to allow of little motion—some of much greater; it would follow that the meeting of the lining after it had been thrown over the different articles, and carried back to the point where you threw the fold, would be longer or shorter, according as you had tied the articles more closely, or left them more or less hanging loosely in the box.

Now, if you understand this, you will at once comprehend the disposition of the serous membranes, which are just arranged in this manner. The abdomen is lined by the smooth serous membrane (the peritonæum), and this is thrown over the various viscera so as to constitute their external covering, and to form part of their structure (their peritoneal coat). The viscera are more or less closely connected to the posterior surfaces of the cavity, and these loose processes of the lining membrane, in the folds of which the viscera are included, are called by certain names:—thus, that which retains the small intestines in their situation is the mesentery; that containing the colon, the meso-colon; and so on of the different bowels (meso-cæcum, meso-rectum). Sometimes they are called, from their immediate offices, ligaments:—thus we speak of the ligaments of the liver, which are formed in the same manner. The serous membrane of the chest is called the pleura; the cavity being lined by a membrane which is thrown over the lungs in the same manner, sustaining them in position, and giving them the

close polished covering which they present on examination. The pericardium is disposed in the same manner, only that there is a bag formed, besides the close covering immediately investing the heart; and on the outer side of this bag there is a membrane of another kind, of a firm and unyielding texture, and not transparent, but thick and fibrous (a fibrous membrane). The serous membranes have, under ordinary circumstances, but a low degree of sensibility; but, like most other structures so circumstanced, become acutely painful in disease, especially in inflammation. They are transparent, elastic, and present a beautifully smooth and polished surface; and the motion of the different parts of this surface in each other is facilitated by an exhalation (which renders it more or less slippery) of serous fluid.

Another kind of membrane is the mucous; these line canals, as the nose, mouth, fauces, alimentary canal, the urinary organs, the windpipe and its ramifications, &c. They are therefore in the form of tubes; they secrete a slippery sort of fluid, which lubricates the parts. Mucous membranes are somewhat elastic, like the serous, and have some other peculiarities, which have already been spoken of in the preceding pages. Sometimes they are associated with serous membranes, as in the function of the stomach and bowels; thus these parts are composed, externally, of the serous membrane (the peritonæum),—internally, of a mucous membrane. Between these, muscular fibres are interspered, forming the muscular coat of the organ: so that you have externally a serous, next a muscular, and internally a mucous coat; and these are united by a substance which I shall immediately speak of under the name of cellular tissue. One other sort of membrane I have yet to mention; this is the fibrous. These membranes, as their name implies, exhibit an arrangement of fibres. They are very firm, strong, and inelastic. The periosteum, which covers the bones; the fasciæ, which bind down the muscles; the outer, or bag-like portion of the pericardium; the dura mater, which lines the interior surface of the scull; are examples of this structure. Sometimes these are lined by serous membranes, as the dura mater and pericardium: sometimes they adhere more or less closely to the parts which they cover, as the fasciæ and periosteum; their general character being those which I have mentioned.

CELLULAR TISSUE.

When you look at the under part of a shoulder of veal or mutton, you observe a portion of flesh but loosely connected with the parts on which it lies by a *stringy*, *extensile*, and somewhat *elastic* matter. This is what we call cellular tissue,—cellular, because we find that it consists of a series of cells, which, under ordinary circumstances, communicate with each other. This cellular tissue in an animal body is roughly represented by the mortar in a building, but with some important differences, presently to be mentioned. Like the mortar, however, it serves as a connecting medium of all parts with those contiguous to them, and hence it is found in all parts of the body; but here the analogy ceases. In the body, this connecting medium is very differently disposed, according to the functions which such parts are to execute. In some it allows of very free motion between the parts which it connects; whilst, by its elasticity, it readily allows of the return of such parts to their more ordinary respective positions. In other parts, where the motion is less, the cellular tissue becomes more dense, its fibres shorter: and again, where parts are to move in concert, as one piece, it is so close and dense as to form a very strong connecting medium, allowing of no motion whatever between them. The cellular tissue is primarily, therefore, employed in connecting various parts with each other, and in allowing, in some cases, such motion as is convenient and safe in the exercise of the several functions of the parts which it connects. In others, in preventing, by its close texture, any motion whatever between them. You thus perceive that, if it become changed in its structure, it will embarrass all parts between which it should allow any freedom of motion, although it may not *necessarily* interfere with their more essential functions.

I have said that this tissue is cellular, the cells communicating with each other; and, where it is arranged in a loose manner, as that beneath the skin, for example, this may be demonstrated by the impulsion of air into it. Butchers, when they kill calves, inflate the cellular tissue by impelling air underneath the skin, so that the whole body of the animal appears inflated. Accident

sometimes produces a similar result in the human body. In some cases of fractured ribs, the rough surface of the broken bone produces abrasion of the lungs; the consequence is, that, as respiration proceeds, a certain portion of the air escapes through the abraded lung, and into the cellular tissue, and this gradually inflates the chest, face, and other parts, in a very frightful manner.

The cellular tissue, as has been already observed, becomes the frequent seat of diseased actions; whether these be of the more active kinds, which we usually include under the different kinds of inflammations, or those which are attended by gradual diseased depositions, which either thicken parts, or forms the various tumours. Nature appears to determine morbid actions here, because they are less injurious than they are commonly found to be in other structures. Like all parts, the cellular tissue is moistened by a fluid, and the diseased increase of this forms the water of general dropsy.

You will find some other remarks on cellular tissue in connection with the Discourse on Sympathy, and I shall have occasion hereafter to return more than once to this structure, in considering different diseases.

NERVOUS SYSTEM.

The simplest idea of the nervous system is conveyed, I think, by remarking, first, the general and obvious physical characters of the brain, spinal marrow, and nerves, and then stating the general nature of their functions. The nervous system, then, in its physical character, may be regarded as representing, generally, a soft, animal substance, of which the brain is an example, which, in some modification of form or other, pervades every part of the body, and which is inclosed in membranes which appear to exercise the function of keeping together the matter so disposed, and, in some measure, protecting it from injury. The nervous matter is sometimes disposed in large masses, as the brain, or in very small knot-like productions, technically called ganglia; sometimes in cord-like prolongations, like the spinal marrow, or the larger nerves; and sometimes in fine threads or filaments, like the smaller nerves. All nerves communicate either directly or indirectly with the brain, the spinal marrow, and with each other; so that, were the nervous

system presented to you apart from other structures, it would represent a large mass of nervous matter in the situation of the head; a long cord in the line of the back; and an inextricable sort of net-work extending from these points to all parts of the body, representing this net-work traversed in different parts by larger cords representing the large nerves. You would also observe some nerves, like the great sympathetic, representing a series of knots or ganglia, having communications, in different parts of its course down the sides of bodies of the vertebræ, with branches derived from the brain and spinal marrow.

Now, the functions of the nerves are nothing less than the means through which we become acquainted with surrounding objects, by which all the organs of the body are so associated as to form one machine, and by which the various offices and uses to which they are destined—functions, as we call them—are executed. In a general sense, you may regard the nerves as follows:—

That extremity most remote from the brain is the collector of impressions, as touch, taste, smell, and so on; the cord which extends from this to the brain is the messenger which conveys such impressions; and the brain or spinal marrow, the part, through some mysterious action of which we become conscious of such impressions, to which we give those names which I have mentioned, or any other, according to the sensations received. Thus the senses of touch, taste, smell, hearing, and seeing, result from certain impressions made by the mechanical properties of bodies, by some property of a more refined kind—by light, and vibrations of air, on the minute terminations of the nerves distributed to the skin, the tongue, the nose, the eye, and the ear, respectively. These impressions are communicated to the brain, on which the sense or perception ultimately depends. To all correct sensation these several phenomena are necessary: that is, impression on the extreme branches, communication along the trunk of the nerves, and certain actions in certain parts of the great nervous masses constituting the brain or spinal marrow. The exercise of the will to move any part depends also on certain nervous communications between that part and the brain being uninterrupted; for, although it does not follow that volition should necessarily be present, such communications remaining entire, yet it is certainly absent if these be disjoined; for certain disorders may prevent this, which either refer to the extreme branches of this nerve in the part supplied, or in the brain

or spinal marrow in which such nerve may terminate, or whence it may issue. Then the brain and spinal marrow hold communications, as it were, of a secret nature, with many parts of the body, which, in states of health, afford us no sensation recognizing what is is going on in the part. Thus I am not sensible of the blood's rapid current through the various organs of my body; I have no sensation informing me directly that digestion, the secretion of bile, &c. are going on in a natural and healthy manner. By experience, indeed, I acquire a very interesting degree of knowledge on these subjects, which, however, it is difficult to describe by any expression of sensation. When these organs are disordered, I feel the absence of comfort in a thousand ways; and I learn to appreciate the advantage, and in some sense to recognize the sensations, of healthy action, in the general, but still expressive terms, of health, comfort, and vigour.

It is an interesting thing to remark, that all organs, whose daily and constant exercise is essential to the life of the body, are placed thus out of the sphere of the will and of ordinary sensation; and that the supply of nerves to them are characterized by the greater or less connection of such nerves with those having in them ganglia or knots, of which I have spoken. Thus I can by my will neither directly influence respiration, the circulation, digestion, the secretion of the bile, nor the action of the bowels: so that the *basis* of the body's safety, and of the mind's moral security, though in neither case prohibitory of a responsible abuse, seem placed out of the sphere of ordinary volition: for in the mind I can will to do right or wrong, but I cannot will away the intuitive general perception of what is right and wrong. Different parts of the nervous system execute different functions; some nerves being nerves of motion, some of sensation, and this may be either common sensation, as we term it, or those by which we recognize light, sound, flavour, and so forth.

The nervous system, as you perceive, is therefore the governing power of all the actions of the body, and it is visibly developed, in a more or less simple form, in almost all creatures which are not too minute for our investigation. In man, however, it is very complex; but the brain is the sentient centre to which every thing is ultimately referred. If the communication be cut off with the brain, the function of the part thus disjoined is, for the most part, abrogated; whilst, if the brain itself be materially injured in that part

with which the nerves more directly communicate, the actions of life cease altogether. The brain, however, has various functions of a still more wonderful kind, which are somehow or other associated with it; but I have already observed as much on this subject as is necessary for our object, in the conclusion of the Discourses on Sympathy. The brain and nerves, like all other parts, are supplied with vessels, absorbents, and the necessary apparatus of a living structure; so that they undergo various diseased changes, like all other structures.

I have thus endeavoured to give you a faint sketch, a very general idea, of the body. I had fully intended to have made it more complete; but I found this objectionable on account of the increase of bulk and price which it would necessarily have occasioned.

After all, however, it may answer the purpose above stated. You will recollect that when we say this or that part is chemically composed of this and that principle, we only mean, proximately; that is, that the putting together of these principles is the nearest step to the structure which they form. In this light, the body appears to be made up of a great variety of things; but if these be traced to their elements, we find them to be very few. We say that water, for example, exists here and there: you see how large a proportion of the blood is formed by this fluid; but this fluid itself, you know, is only formed by oxygen and hydrogen in certain proportions, and these principles are found in the body, not necessarily in the form of water. So, when we speak of albumen, or gelatine, the one as being coagulated by a certain heat, as by hot water, the other as dissolving in it, we speak of different forms of animal matter: but all animal matter, if its analysis be continued so as to resolve it into its ultimate principles, is found to consist essentially of four elements, in various degrees of combination; these elements being carbon, hydrogen, nitrogen, and oxygen. We find, however, small proportions of sulphur, iron, and certain salts, added to some animal matters; but the essential elements are those which I have mentioned.

You should also remember that all parts of the body are provided with vessels to supply the blood, and to convert it to the structure required, with vessels to return the superfluous blood, with absorbents to carry away the old material, with organs to separate and eject it from the body, with nerves to give the

several parts their vital powers, and with cellular tissue to connect the whole together; so that every part is made up of arteries, veins, absorbents, nerves, cellular tissue, and the peculiar matter of which the part is composed. In many instances, the part appears to consist of nothing else but the ramifications of the different vessels and nerves which I have mentioned; further, you should never forget that every part of the body forms but a portion of one machine, everywhere furnished with powers of resisting, in a certain degree, injurious influences, or of repairing the mischief which they may have produced, and between all parts of which there is a correspondence and a concert of action, by means of the nervous system, which subjects the whole body to *common laws*, and renders it one harmonious creation.

FINIS.

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BY THE SAME AUTHOR.

ON THE UNITY OF THE BODY,

Being an application of the Phenomena of SYMPATHY to the Improvement of the Constitutional Treatment of Local Diseases.

PRACTICAL DIRECTIONS TO FACILITATE
THE
DISTINCTION OF HERNIA AND OTHER TUMOURS OCCURRING IN THE VICINITY OF THE GROIN.

With REMARKS on TRACHEOTOMY, as applied to the Treatment of Severe Cases of CHRONIC LARYNGITIS; with Cases.

A PRACTICAL TREATISE
ON
STRICTURE OF THE URETHRA;

The object being to adapt the various Modes of Treatment recommended by different Surgical Writers, to their appropriate Cases; with Remarks on

STRICTURE OF THE RECTUM AND ŒSOPHAGUS.

CLINICAL OBSERVATIONS
ON THE CONSTITUTIONAL ORIGIN OF THE
VARIOUS FORMS OF PORRIGO,

Commonly called Ringworm, Tinea, Scald-Head, &c. with Directions for the more Scientific and Successful Treatment of this hitherto obstinate Class of Diseases.

*** For Notices of these Works, see *Cooper's Surgical Dictionary; Med. Chir. Review; Foreign Quarterly Journal of Med. Science; Edinb. Med. and Surg. Journal; London Med. and Surg. Journal; Lancet;* and most other Medical Periodicals of the years 1824–5, 1830–1, 1834–5.